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Chicago, Ill. No. 48 March, 1947

Bibliography: Birds

Strong, Reuben M. A bibliography of birds with special reference to anatomy, behavior, biochemistry, embryology, pathology, physiology, genetics, ecology, aviculture, economic ornithology, poultry culture, evolution, and related subjects. Part 3 Subject Index (Field Museum of Natural History, Chicago 5, Ill.), Publ. 581, 1946(1947), 522 pp. [+ 6 pp. of Corrigenda].

This is the key volume to the two noticed in WILDLIFE REVIEW, No. 27, May 1940, p. 2. It is of limited independent value but increases many fold the usefulness of the others. A 6-1/2 page list of bibliographies of birds and a 2-1/2 page list of periodicals, containing notices of articles on birds, are presented in addition to the subject index, comprising the bulk of the volume. This index is comprehensive and characteristically yields a gratifying number of references upon restricted topics. Good bibliographies are among the most cherished aids of the scholar and this one ranks high.

Classification: Grouse, Ruffed

Snyder, L. L., and T. M. Shortt. Variation in Bonasa umbellus, with particular reference to the species in Canada east of the Rockies, Canadian Journ. Research (National Research Council of Canada, Ottawa) D, 24, pp. 118-133, 1 map, tables.

Authors' abstract: "A study of 624 specimens of Bonasa umbellus shows that variation in the species in eastern North America consists in a loss of red pigment from south to north. Westward in Canada there is a reduction of black resulting in paleness and greyness. This variation resolves itself into eight subspecies, which can be grouped into two 'super-subspecies,' based on the potential for redness. The ratio of colour phases and 'trimming' of most Canadian races has been worked out. The type locality of B. u. umbelloides has been determined as Belvedere, Alta. The race canescens of Todd is found valid and the evidence is presented by the application of a simple quantitative tone or value scale. Its range extends from James Bay to central and western Ontario, consequently the range of B. u. togata is greatly restricted in Ontario. Minor refinements of the ranges of other races are presented. The incidence of the red phase is higher in females, the percentages of occurrence suggesting that this phase is a sex-linked recessive character. A variation designated as 'copper-trimmed' is more prevalent in males and may be controlled by a dominant sex-linked factor." The map outlines the ranges of 13 North American subspecies. Bibliography of 11 titles.

Classification: Upland game birds

Ridgway, Robert, and Herbert Friedmann. The birds of North and Middle America. U. S. Nat. Mus. Bul. 50 (Part X) (Supt. of Documents, Washington 25, D. C. $1.25 a copy), xii+484 pp., 27 figs., 1946 (rec'd. Jan. 1947).

Continuation of this well-known and very useful revision of the birds of the Americas north of Panama, containing keys, synonymies, descriptions, and statements of range. The families treated in this volume are the Cracidae, Tetraonidae, Phasianidae, Numididae, and Meleagrididae.

Conservation: International

Coolidge, Harold J. Report of the American Committee for International Wildlife Protection activities for the Society of Mammalogists, Pittsburgh, 1946, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 27(4), Nov. 1946, pp. 407-409.

Events of importance in this field during the war; special conservation activities including: protection of gorillas; publication of volumes on extinct and vanishing mammals (abstracted in WILDLIFE REVIEW Nos. 36, March 1943, p. 6, and 44, October 1945, pp. 9-10); ratification by a sufficient number of signatories of the Pan American Convention on Nature Protection; establishment of a Fish and Wildlife Branch in the International Resources Division of the State Department, U.S.A.; and attention to nature protection in Pacific areas.

Conservation: Waterfowl

Day, Albert M. The problem of increased hunting pressure on waterfowl, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 55-61.

All signs point to a great increase in post-war hunting pressure. Proof of it in relation to waterfowl is furnished by the largest ever sale of duck stamps. The Fish and Wildlife Service has resisted great pressure for liberalization of hunting privileges, yet there has been a decline in the wild fowl population during the past two seasons. More than the yearly increase has been shot and restriction of the kill is the only quick means of adjusting hunting pressure to the supply. Marsh restoration is important but drought may render it ineffective. Improvement of the breeding territory is an immense job, only a fraction of which is feasible, but providing additional adequate wintering grounds also is important. Better public understanding is essential to success in conserving the waterfowl and this can be attained only through authentic publicity.

Conservation: Waterfowl

Griscom, Ludlow. An ornithologist looks at waterfowl, Audubon Magazine (1006 Fifth Ave., New York 28, N. Y. 45 cents a copy), 49(1), Jan.-Feb. 1947, pp. 37-46, 7 photos, 2 maps.

Discussion on biological grounds concluding with the following recommendations: "(1) The degree to which hunting is liberal or restricted should depend (a) upon the carrying capacity of the environment because that determines the supply and (b) whether the amount of suitable territory is shrinking or expanding. Neither of these factors remains static for very long; (2) those species of waterfowl whose breeding or winter ranges have been the most seriously

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destroyed by civilization should be given special protection to the degree required; (3) those species which show marked inability to adjust properly to civilization should receive some extra protection. Outstanding examples are the redhead and ruddy duck; (4) hunting should be closed in those sections of the winter range where a failure in food supply occurs, where disease breaks out, or severe drought conditions exist; (5) further research and improvement in techniques is possible in estimating the plant and animal food crop on the winter range; in other words, its carrying capacity. This would be more important than a mid-winter census; (6) the results of the breeding season and the carrying capacity of the winter range furnish the ideal criteria for the open season, whichever is the lower; (7) the annual kill should never exceed a minor percentage of the total annual losses; (8) the annual kill should never reduce the total population below the carrying capacity of the winter range; (9) there is no ground for abandoning hope that our waterfowl can be restored or increased as well as conserved. An extension of the wildlife refuge program particularly in the winter range, is a prerequisite for a permanent gain; (10) more liberal hunting must not kill off the surplus population which must be created; (11) an increase in hunters must be compensated for by a corresponding decrease in the permissible take; (12) if this surplus population has additional preserved or reclaimed territory in which to breed and winter, a permanent gain will have been made.

"Sportsmen and bird-lovers will both gain in the long run, and our duty to conserve our natural heritage of wildlife will have been more than well done."

Conservation: Whales

Deason, H. J. Conservation of whales--a world-wide project, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 260-273, 1 map, 5 tables.

Historical sketch of whaling and of the utilization of whale products--an exploitation that was developed to a higher pitch than has been the case with any other animals and which was extended to every habitat. Statistics of the kill are given for the years 1868-1939, showing total numbers and the seas from which taken. The Antarctic, last invaded, "remains the only stronghold of whale populations." Efforts at international cooperation in whale conservation are discussed. "The history of whaling from its inception has been a continuous process of the exploitation of one area until it was exhausted and the moving on to another area. No new areas are left for exploitation! The world must be satisfied with what resources it now has, and bend its efforts toward their restoration. The whales provide an excellent opportunity for demonstrating what all maritime nations can do by working together in the field of whale conservation. If the nations of the world concerned with whaling cannot collectively manage and preserve the resource, international cooperation in general would seem to face a dismal future."

Control: Crop damage by ducks

Wagar, J. V. K. Colorado's duck-damage, grain-crop problem, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 156-160.

The damage was chiefly to corn, field peas, and sorghums in irrigated areas. Farm practices and labor shortages sometimes favored the losses. If spread over the entire area, the damage might have been endurable but in some cases several thousand ducks on a single farm caused ruinous losses. Special hunting seasons were devised to remedy the situation and later individual permits for shooting out of season and out of hours were tried. They proved helpful but they were also abused. The recommendations of a committee organized to consider the entire situation are quoted. "Experience has shown that no one control will eliminate damage done to crops by Colorado's mallards and still maintain a desirable mallard population. It is increasingly apparent, however, that if all agencies with effective interests can cooperate in the use of all available controls this problem can be reduced to comparative simplicity and then completely solved." Bibliography of 5 titles.

Control: Fox, Red

Switzenberg, D. F. Michigan's foxes can furnish sport and profit, Michigan Conservation (Michigan Dept. of Conservation, State Office Bldg., Lansing 13), 16(1), Jan. 1947, pp. 6-7, 2 photos.

Comment on recent, and previous, periods of abundance of the red fox and their causes. Damage done by the animals when abundant and methods of control, especially trapping for fur and hunting for sport. Den-hunting, poisoning (illegal), and bounties also are discussed.

Cycles: Grouse, Ruffed

Latham, Roger M. Even grouse have ups and downs, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg. 10 cents a copy), 17(8), Nov. 1946, pp. 10-11, 3 photos.

The bird is again at a low in its cycle and for the third time in 28 years the Game Commission has declared a close season in an effort to hasten grouse rehabilitation. Theories relating to the causes of cycles are discussed. In Pennsylvania, since 1915, each time the grouse have come back from a "low" they have failed to regain the level of the preceding "peak". The prosperity of grouse in the State, like that of deer, is related to the ecological condition of the woodlands, and is adversely affected by overpopulations of the deer themselves. There is some comment on predation and on winter mortality. However, both the cycle and what to do about it remain mysteries.

Cycles: Grouse, Ruffed

Miller, Wilford L. 1946 ruffed grouse census completed, North Dakota Outdoors (Capitol, Bismarck. 5 cents a copy), 9(8), Feb. 1947, pp. 13-14.

In sample areas the numbers expressed as acres per bird were: 60 in 1944; 75, 1945; and 465, 1946. "There may be as few as 6,000 birds in the region to-day as compared to an estimated 100,000 in 1940-41."

Destruction: By DDT

Couch, Leo K. Effects of DDT on wildlife in a Mississippi River bottom woodland, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 323-329.

Report on the same project (Savanna Ordnance Depot Proving Grounds, Illinois), paper on which was abstracted in WILDLIFE REVIEW, No. 46, July 1946, p. 7. The author discusses: objectives and plans, ecology of the sprayed area, application of DDT by airplane, method of study, and effects upon various groups of animals. Summary and conclusions are presented. From the latter we quote: "While the results herein noted at the rates applied show no losses to birds and mammals, the breaking up of food chains through suppression of insects and cold-blooded vertebrates may have serious indirect consequences. Little is yet known of the accumulated effects traceable to DDT, particularly in bird nesting seasons, or the resulting shift of bird and mammal populations. Intensive research is needed to answer these questions. The present whole-hearted cooperation of biologist, entomologists, and public health officials, is a healthy sign that technicians are working together in the end that a useful chemical may perform benefits for the human race, and at the same time preserve those forms of life which we all enjoy and cherish."

Destruction: Hawks in Washington

Lumley, Ellsworth D. The truth about Washington hawks. Seattle Audubon Society (6224 25th St., N. E., Seattle 5, Wash.), 6-page folder (3-3/4 x 8-1/2 inches).

Employes of the Washington State Game Department apparently are killing hawks without regard to species. As most of the birds were destroyed in eastern Washington, the bulk of the kill consisted of the larger hawks that are protected by law. "Thus we find the State Game Department, whose responsibility it is to see that Washington wildlife is protected, violating the very laws it is supposed to enforce." "Killing programs should not be inaugurated until the men taking part are fully instructed and are carefully trained in identifying species to be killed." Again pole traps used on the game farms in the State destroy a majority of "protected" species of both hawks and owls. No record was kept of the song birds killed in these traps in violation of State and Federal laws or regulations. The record is definitely one of bad wildlife management. The Seattle Audubon Society makes a number of recommendations to improve the situation.

Diseases and Parasites: Bird vectors of fish diseases

Cameron, T. W. M. Black spot and yellow grub in fish, Rod and Gun in Canada (1410 Stanley St., Montreal, Canada. 15 cents a copy), 48(5), Oct. 1946, pp. 12-13, 44, 3 figs., 1 table.

The intermediate hosts of trematodes affecting fishes include the loon, great blue heron, and kingfisher. Scientific names of the flukes and of snail intermediate hosts are given.

Diseases and Parasites: Botulism

Zimmerman, F. R. Western duck sickness (botulism) in the Green Bay area, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison), 11(12), Dec. 1946, pp. 3-7, 2 photos.

Review of past occurrences of botulism; notes on cause of the disease and symptoms in waterfowl; discussion of its occurrence in the Green Bay area with tabulation showing the kinds and numbers of birds affected. The basic cause is sewage pollution of the Fox River and Green Bay reducing the oxygen content of these waters, thus providing favorable habitat for the botulinus bacillus. No relief can be expected until this condition is corrected. "Acetylene gas exploders helped to frighten the birds away from infected areas, and should be used pending the removal of the basic causes for these epidemics." Bibliography of 6 titles.

Diseases and Parasites: Necrobacillosis

Cass, Jules S. Buccal food impaction in whitetailed deer and Actinomyces necrophorus in big game, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 91-94, 1 pl.

Description and illustration of a Minnesota specimen and review of literature on actinomycosis in American big game. Pathology of the disease. Bibliography of 7 titles.

Diseases and Parasites: Rickettsialpox

Huebner, Robert J., Wm. L. Jellison, and Charles Pomerantz. Isolation of a Rickettsia apparently identical with the causative agents of Rickettsialpox from Allodermanyssus sanguineus, a rodent mite, U. S. Public Health Reports (Supt. of Documents, Washington 25, D. C. 10 cents a copy), 61(47), Nov. 22, 1946, pp. 1677-1682, 2 tables.

A Rickettsia (here first named R. akari) from mites (Allodermanyssus sanguineus) infesting house mice was found apparently identical with that from a man ill with rickettsialpox. New York, N. Y. Bibliography of 7 titles.

Diseases and Parasites: Tularemia

Allen, B. Randolph. A word to the cottontail hunter, Virginia Wildlife (Commission of Game and Inland Fisheries, P. O. Box 1642, Richmond 13, Va. 10 cents a copy), 7(4), Oct. 1946, pp. 6-7.

Popular account of the disease and its transmission; most human cases are contracted through handling rabbits; 63 reported in Virginia in 12 months, 1945-46; symptoms; precautions for avoiding the malady.

Diseases and Parasites: Tumors of deer

Quortrup, E. R. Tumors of deer, Virginia Wildlife (Commission of Game and Inland Fisheries, P. O. Box 1642, Richmond 13, Va. 10 cents a copy), 7(1), July 1946, pp. 15, 18, 2 photos.

Papillomas in animals and man; fibromas in deer; nature of the lesions and possible method of transmission.

Diseases and Parasites: Typhus control

Ludwig, Russell G., and H. Page Nicholson. The control of rat ectoparasites with DDT, U. S. Public Health Reports (Supt. of Documents, Washington 25, D. C. 10 cents a copy), 62(3), Jan. 17, 1947, pp. 77-84, 3 pls., 2 figs., 3 tables.

Report on experiments at Savannah, Georgia. These "Field studies were initiated to determine the degree of control effected against rat ectoparasites by treating rat-infested premises with 10-percent DDT dust. Eleven study premises were trapped before treatment, 1 week following treatment, and at approximately monthly intervals thereafter. From rats trapped in untreated premises, only the oriental rat flea, X. cheopis, was found in sufficient numbers and uniformity of distribution to permit an analysis of normal seasonal populations. Treatment was effected by blowing the 10-percent DDT dust into burrows and enclosed harborages with a cyanogas foot-pump duster and by sifting a light layer of dust along rat runways with hand-shaker dusters. Spectacular and consistent control of X. cheopis resulted in all 11 establishments, with the control percentage dropping off from an initial 99.3 percent at the rate of approximately 5 percent per month for the 4 months following treatment. A degree of control was achieved against rat mites and rat lice, but data were insufficient to justify the statement of a definite percentage." X. stands for Xenopsylla. A list of 5 species of fleas, 4 of mites, and 1 louse taken from the rats is given on page 78.

Diseases and Parasites: Cestoda, Choanotaenia

Owen, Ruth L. A new species of cestode, Choanotaenia numenii, from the long-billed curlew, Trans. Amer. Microscopical Soc. (Frank E. Eggleton, University of Michigan, Ann Arbor. $1.00 a copy), 65(4), Oct. 1946, pp. 346-350, 4 figs., 1 table.

From Nebraska; description, illustrations, measurements, comparative notes, and table (for 5 species). Bibliography of 8 titles.

Diseases and Parasites: Cestoda, Paranoplocephala

Rausch, Robert. Paranoplocephala troeschi, new species of cestode from the meadow vole, Microtus p. pennsylvanicus Ord., Trans. Amer. Microscopical Soc. (Frank E. Eggleton, University of Michigan, Ann Arbor. $1.00 a copy), 65(4), Oct. 1946, pp. 354-356, 3 figs.

Description, measurements, illustrations; comparative notes. Ohio and Michigan. Bibliography of 6 titles.

Diseases and Parasites: Helminths of Mustelidae

Erickson, Arnold B. Incidence of worm parasites in Minnesota Mustelidae and host lists and keys to North American species, Amer. Midland Nat. (Notre Dame, Ind. $1.00 a copy), 36(2), Sept. 1946, pp. 494-509.

Review of literature of which 63 titles are cited; relation of the parasites to food habits of hosts; tabulation of incidence by hosts and organs infested; and other matters noted in title.

Diseases and Parasites: Nematoda, Onchocerca

Herman, Carlton M., and Arthur I. Bischoff. Foot worm parasite of deer, California Fish and Game (Ferry Bldg., San Francisco 11, Calif.), 32(4), Oct. 1946, pp. 182-190, 4 tables.

History of knowledge of foot worms in ruminants (11 citations of literature); notes on methods and results of this study, including number of worms in infected deer; size and sex ratio of the worms, their location in the host; pathology, and pathogenicity. No harmful effects were noted.

Diseases and Parasites: Trematoda, Cyclocoelum

Zeliff, C. Courson. A new species of Cyclocoelum (a trematode) from the eastern solitary sandpiper, Ohio Journ. Science (John A. Miller, Ohio State University, Columbus. 50 cents a copy), 46(6), Nov. 1946, pp. 340-342, 1 pl.

Description, measurements, illustration, comparative notes; Pennsylvania. Bibliography of 10 titles.

Diseases and Parasites: Trematoda of mammals

Chandler, Asa C., and Robert Rausch. A study of strigeids from Michigan mammals, with comments on the classification of mammalian strigeids, Trans. Amer. Microscopical Soc. (Frank E. Eggleton, University of Michigan, Ann Arbor. $1.00 a copy), 65(4), Oct. 1946, pp. 328-337, 1 pl.

Descriptions, illustrations, measurements of four new species: Fibricola nana from the red squirrel; Alaria dubia, weasel; A. minuta, mink; and Pharyngostomoides ovalis, raccoon. Four pages of discussion of classification. Bibliography of 8 titles.

Ecology: Availability of weed seeds

Bishop, James S., and George P. Spinner. Quantities of weed seed produced in Connecticut cornfields, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, pp. 300-303, 3 tables.

Methods of the study are defined. The percentage of occurrence of 8 species of weeds and of the weight of seeds contributed by them is tabulated as well as the calculated seed weight per acre of the fields sampled. "The most important weed was ragweed, with pigweed, smartweed, and yellow foxtail valuable." Highest production was on fertile soils and in fields grown to corn the previous season. Weight of seed per acre varied from 28 to 358 pounds. Plots on or near field edges contained more species of weeds and more stems per plot and produced more seed than those in the centers of fields. Hence small fields were more productive, on a per acre basis, than large ones.

Ecology: Census methods, deer

Cronemiller, F. P., and G. A. Fischer. Censusing a deer herd by sampling methods, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 349-354, 2 figs.

Method applied to deer of an Oregon-California herd which are in more or less continuous movement over the winter range. Cover types and visibility are described. Strip counts converted into deer per square mile were used in estimating the number of deer by types and sample areas; these were repeated at intervals of 10 days to 2 weeks. Field methods are noted and accuracy of the method is discussed. Travel by automobile was preferred. "While the relationship of the computed number to the true population is not now known, it is believed a correlation for some areas may be developed. Possibly this cannot be done to a point much closer than the current guess. Perhaps it is not important. The present method is believed to provide an adequate base from which to record trends, recommend desirable take, and determine quite accurately the effects of the management principles applied. For this area and perhaps others similar in character, it is believed the method is adequate for existing extensive game management."

Ecology: Census methods, grouse, ruffed

Frank, William John. Ruffed grouse censusing in west-central Connecticut, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 287-294, 1 fig., 3 tables.

The study area and census method are described and the results set forth in text and tables. The results from drumming site counts agreed very well with those of strip counting. A population curve is presented, the average flushing distance in various forest types by months is tabulated, and the paper summarized. The following elaborations of the King method are recommended: "(1) Census grouse monthly, exclusive of the summer months, so as to obtain a series of monthly population figures from which a population curve may be drawn. Do not use an individual census figure as a population figure; (2) use as much census line as possible for, within limits, the more line covered the greater are the chances of flushing birds and likewise the more flushing distances will be obtained; (3) the censusing should be performed in a single day whenever possible. The longer the censusing period the greater the susceptibility of weather change; (4) record the forest cover type for each bird flushed and compute an average flushing distance per forest cover type. Use these averages for birds that flushed but for which no distances were obtained." Five titles of literature cited.

Ecology: Cover mapping

Arnold, Milton C. Cover mapping for forest and wildlife management in Connecticut, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 330-338, 4 figs., tables.

Symbols employed, samples of their use, field methods and records. Author's summary: "The method of cover mapping described applies to forested areas where a detailed knowledge of plant distribution and abundance is a requisite to practical forest and wildlife management. Separate maps of forest types and the associated undergrowth and ground-cover are prepared by sections on sheets of small size so that they may be bound in book form. The segregation of the two types of cover data and the division into subcompartments based on forest types is intended to permit a clearer interpretation of map data and a ready comparison of corresponding areas without the use of an overlay or similar method. The method may be applied to other localities by adjusting the forest type classification and species index to conform to local conditions."

Ecology: Edge effect

Linduska, J. P. Edge effect as it applies to small mammals on southern Michigan farmland, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 200-204, 1 fig., 1 table.

Reference is made to studies of the effects of soil conservation farming on wildlife and studies of the subject at the Rose Lake Wildlife Experiment Station are partially reported upon. The study was made by live-trapping and the animal chiefly concerned was the prairie deer-mouse. This species was taken with less frequency near edges than distant from them. Strip-cropping appeared not to favor an increase in mouse numbers. Bibliography of 5 titles.

Reminder. Edge effect was originally spoken of in relation to the edges of woodland. Here life is more abundant than in the interior, chiefly it seems

because of ample light promoting a variety of vegetation of all storeys. In field crops of approximately uniform height and density, there would be no difference in light, hence presumably no edge effect.

Ecology: Longleaf pine

Wahlenberg, W. G. Longleaf pine. Its use, ecology, regeneration, protection, growth, and management. Charles Lathrop Pack Forestry Foundation (Washington, D. C.), xxii+429 pp., 48 pls., 74 figs., tables, 1946.

"Longleaf pine is a temporary type in that without the influences of fire and man it would eventually be succeeded by a forest of mixed hardwoods. Any management system, therefore, that maintains longleaf as a forest must arrest the trend of natural succession. Among the natural factors controlling the regeneration of longleaf, fire is undoubtedly most influential." The longleaf pine forests of the South "are so dependent upon fire that their normal life cycle cannot continue without its influence." The various influences of fire in relation to the pine are discussed and the chapter is in pleasing contrast to what most foresters have said about fire in southeastern pine lands. See many entries in past issues of WILDLIFE REVIEW under Management: Burning.

In a chapter on protection from enemies, the author discusses damage to seedlings by pocket gophers and other mammals and to the seed crop by rodents and birds. Useful activities of birds, especially woodpeckers and hawks, are mentioned. References to special publications on these subjects are given.

The management of quail as a supplementary crop on longleaf pine lands (pp. 310-311) is abstracted from publications by Herbert L. Stoddard. The bibliography is tremendous (637 titles).

Ecology: Overpopulations, deer and elk

Packard, Fred Mallery. A study of the deer and elk herds of Rocky Mountain National Park, Colorado, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 28(1), Feb. 1947, pp. 4-12, tables.

Characteristics of the range and histories of the deer and elk herds. Author's summary: "A review of previous reports on the range problem in Rocky Mountain National Park demonstrates a serious deterioration of the forage plants on the lands of the district where deer and elk concentrate in winter. Although browse plants show the greatest damage, there are indications that forage grasses are seriously and adversely affected also. This depletion has progressed, in spite of fairly good climatic conditions, until the range has reached a condition requiring remedy. The basic cause of range depletion is the overpopulation of deer and elk. A review of the natural and artificial influences operating upon the herds reveals that the annual birth rate and mortality rate of the deer approximately balance, so the herd has reached a more or less static level. This number, however, is above the optimum carrying capacity of the range. The birth rate in the elk herd greatly exceeds the mortality rate, so that elk are continuing to increase rapidly." Bibliography of 6 titles.

Ecology: Overpopulations, moose

Aldous, Shaler E., and Laurits W. Krefting. The present status of moose on Isle Royale, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 296-306, 3 figs., 1 table.

From 1929 to 1935 the moose population depleted its food supply and dropped from a few thousands to a few hundreds in number. Damage to the habitat was increased by the spruce budworm and by fire, but after recovery the burned areas had more browse than the remainder of the island. The low point was reached sometime between 1935 and 1937 and the animals are again increasing. The results of censuses by airplane and of browse surveys are set forth; the paper is a notable contribution to knowledge of the food habits of the moose. Authors' conclusions: "(1) The present moose herd is preventing a satisfactory recovery of the aquatic food plants which were so severely depleted by the recent high population; (2) twenty-eight plants were found to be utilized during the winter, but 12 of these formed 95.5 per cent of the food eaten and of this number 6 formed 75.4 per cent. This clearly demonstrates that a few species are receiving most of the browsing pressure. In fact seven of these plants are being utilized in excess of their regenerative ability; (3) an airplane census in the spring of 1945 showed that the moose herd had increased to approximately 500 animals. While figures on the actual number of moose is desirable, the real criterion is in the condition of the available browse regardless of the accuracy of the population estimates made. Both writers believe that the carrying capacity of Isle Royale has now been reached; (4) if the moose herd continues to increase without some kind of a check, the plant succession on the island will be influenced still more drastically by a moose made ecology. The resulting problem in wildlife management is being given consideration by the National Park Service." Four titles of literature cited.

Ecology: Populations, birds

Kendeigh, S. Charles. Bird population studies in the coniferous forest biome during a spruce budworm outbreak. Dept. of Lands and Forests (Ontario, Canada) Biol. Bul. 1, 100 pp., 32 figs., 6 tables, 1947.

Population studies made in an investigation of the effects of DDT spraying. Location and description of the study area (north of Lake Superior), including its climate and forest. The process of spraying is described and 5 instances of bird mortality or illness apparently caused by it are noted. "This study showed that an application of DDT in an oil spray at the rate of one pound per acre in late May and June and which caused an insect kill of 50 to 60 percent produced a negligible observed mortality of birds and did not affect the size of the total breeding bird population nor the success in raising of young. In spite of the decrease of the insect food supply of the birds due to the insecticide, the spruce budworm remained enormously abundant, and there can be little doubt but that the response of the bird population to the insect outbreak was a normal one largely unaffected by the interference."

The remainder of the paper is a report on a bird population study. The early spring avifauna is listed, arrival dates of migrants recorded, and data on the breeding population tabulated and compared with those for other areas of coniferous forest. "The density of the breeding population was 319+ pairs per 100 acres in the forest and 169+ pairs per 100 acres in the cut-over area." The food habits of the birds are discussed in general terms and the results of the examination of 87 stomachs tabulated (identifications in most cases only to families or larger groups). The birds fed freely on the spruce budworms but were estimated to consume "only 4.3 percent of the total population of this insect species." "Probably the greatest effect of birds on the spruce budworm is to prolong the intervals between successive outbreaks." Food and other relationships affecting territories are considered in some detail and numerous maps of nesting territories are presented. The population apparently was unusually high in response to the increased food level provided by the spruce budworm outbreak. The population phenomena are discussed from the ecological and evolutionary points of view and summarized. From author's summary: "Analysis and interpretation of the dynamic forces at work in the population support the contention that intra-species competition is responsible for limiting the maximum density of species at a level conditioned by the food supply and climate. Inter-species competition may replace intra-species competition to a certain extent where there is over-lapping in niche requirements. This control by competition is not rigid, however, so that temporary over-populations frequently occur. The segregation and limitation of species to particular niches is in large part effected by inter-species competition, although this competition is not very obvious except in times of stress, due to the development of inherited behavior patterns that automatically assign each bird to its proper place in the community." Bibliography of 47 titles.

Economics: Beaver damage

Hoene, John V. North Woods beaver trouble, American Forests (919 Seventeenth St., N. W., Washington 6, D. C. 35 cents a copy), 52(11), Nov. 1946, pp. 538-539, 560, 2 photos, 1 fig.

Thousands of dollars' worth of timber is being destroyed in Minnesota by beavers flooding woodland by blocking drainage ditches. Losses particularly heavy in the International Falls area are greater than those due to fire. Not only are standing trees killed but new growth is prevented. There is also considerable damage to roads. Trapping should be directed toward restricting beavers to hilly parts of the State where their presence is less harmful.

Economics: Fur

Hamilton, W. J., Jr. Primeness, condition and fur values, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 162-165, 1 fig.

The raw fur crop has a high value (75 million dollars annually) depending in large measure, however, upon primeness and condition of the pelts. "Primeness" and "condition" as judged by dealers are defined and the seasons when New York furs, by species, are at their best are depicted in text and

graph. After priming, fur deteriorates through wear and the effects of weather; that taken early in the season is most valuable. Suggestions are made as to open seasons and education of trappers in the light of knowledge of the peak condition of furs.

Economics: Fur animals, Minnesota

Highby, Paul R. Value of 1945 fur catch tops all records, Conservation Volunteer (Minnesota Dept. of Conservation, State Office Bldg., St. Paul 1), 9(55), Nov.-Dec. 1946, pp. 45-49, table.

Discussion of factors affecting the catch which was greatest in value though not in number. Minnesota's fur production seems second only to that of Louisiana. Nearly 90 percent of the pelts were sold to dealers in the State. Overturn in the fur business is estimated ($28,500,000). Income to fur farmers was in excess of $2,000,000, of which 93 percent was from sales of minks. License fees from trappers and buyers and receipts from the disposal of confiscated illegally taken furs are estimated. The status in the catch of mink, muskrat, beaver, and otter is discussed. The table compares the catch by species in 1944 and 1945, giving numbers of pelts, estimated value per pelt, and totals. The grand total for 1945 is $6,674,105.

Economics: Fur animals, Ohio

Leedy, Daniel L. Some observations on Ohio's fur crop, Ohio Conservation Bul. (Division of Conservation and Natural Resources, 1106 State Office Bldg., Columbus 15, Ohio. 10 cents a copy), 11(2), Feb. 1947, pp. 4-5, 20, 2 photos, 4 tables.

Seven species of fur animals are listed as extirpated from the State. [Is it not likely that some otters still persist?] Despite the early abundance of some forms, it is probable that there are more muskrats and opossums in Ohio today than in 1800. In five of the last 10 years, Ohio has ranked fourth or above in national statistics as a fur-producing state. A tabulation is presented of the number of pelts handled by Ohio fur dealers, 1938-46; the average has been around nearly a million annually, not including furs sold outside the State. The value of the crop is discussed principally on the basis of the 1945-46 season when dealers paid about $2,400,000 for the raw furs. Muskrat pelts contributed 76.8 percent of the total number and 71.4 percent of the value. Details are given also for other species. Several management suggestions are made.

Economics: Game, Virginia

Anon. Replacement value of game killed, Virginia Wildlife (Commission of Game and Inland Fisheries, Richmond, Va. 10 cents a copy), 7(6), Dec. 1946, p. 9.

Tabulation of the kill in Virginia 1945-46 of 23 groups of fur animals and game birds and mammals with estimated replacement costs. The total runs to nearly 3-1/2 million dollars.

Education: Conservation

Palmer, E. Laurence. Mutually essential conservation education and rural education, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 88-91.

A great deal of wildlife is the product of rural areas and to assure some degree of management, the best plan is to show landowners the advantages of encouraging wildlife and how it may be done. The author presents 8 recommendations on the essential education by the New York State Rural Policy Committee. In 27 years, he has distributed 108 tracts on rural education, a fair proportion of which have emphasized conservation. The campaign, intentionally geared low but for a long run, has been extended to other states. Qualifications for rural conservation teachers and the bearing of the National Science Foundation upon conservation are discussed. Dr. Palmer asserts "the importance of developing a close connection between rural education and conservation education because of the fact that wildlife at least is basically a product of rural areas. I am hopeful that things are shaping up so that given a little time, a little patience, some honest cooperation and freedom from political intrigue we may be able to solve the problems here developed. I like to think that eventually we will have a rural population genuinely interested in the cause of conservation, properly informed as to how it may contribute to its advancement and an urban population truly appreciative of the contributions rural folk may have made in this field."

Education: Learning eastern birds

Hausman, Leon A. Field book of eastern birds (G. P. Putnam's Sons, Inc., New York 19, N. Y. $3.75 a copy), xvi+659 pp. The illustrations by Jacob B. Abbott include black and white figures for each species (and some subspecies) and 6 double plates, each in a blue, and in a full color, state.

Relatively speaking popular bird books have "rained on us" in recent years but all are welcome and this one by no means least. The black and white drawings are good and probably will suffice for identification in a great majority of cases. The colored plates supplement them in certain complex groups. The introduction gives suggestions for bird study, an illustrated key to groups occupies nearly 50 pages, and a textual key to birds commonly seen about home grounds another 10. In the main body of the work, field keys are given for each family. The specific accounts deal concisely with: names, field marks, description, characteristic habits and notes, habitat, and range. There is an ample bibliography of recent bird books (including 12 bulletins of the New Jersey State Agricultural Experiment Station prepared by the author) and a thorough index. A good book to have around.

Food Habits: Birds vs. ants

Knowlton, G. F., R. S. Roberts, and S. L. Wood. Birds feeding on ants in Utah, Journ. Economic Entomology (E. N. Cory, College Park, Md. 75 cents a copy), 39(4), Nov. 1946, p. 547.

"A number of the species [of ants] are serious pests of range, farm land, orchard, and household." A tabulation is presented which shows the number of stomachs of 108 species of birds that contained ants and the number of ants eaten. Comments on the leading consumers of these insects. "Ants constitute an important item in the diet of many range and farm land birds."

Food Habits: Birds vs. grasshoppers

Knowlton, George F. Grasshoppers eaten by Utah birds, Journ. Kansas Entomological Soc. (Lawrence), 19(2), April 1946, pp. 71-72, 1 table.

Grasshoppers are annually injurious in Utah and considerable sums are expended in control efforts. The services of birds in steadily combating these pests should be appreciated. Sparrow, Swainson, and red-tailed hawks are especially voracious consumers of grasshoppers. The tabulation shows the number of stomachs of 56 species of birds examined and the number of grasshoppers found in them.

Food Habits: Damage to marshes by geese and muskrats

Lynch, John J., Ted O'Neil, and Daniel W. Lay. Management significance of damage by geese and muskrats to Gulf Coast marshes, Journ. Wildlife Management (Logan J. Bennet, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 50-76, 4 pls., 3 figs.

Comment on the economic value of geese and muskrats in coastal marshes of Louisiana and Texas, with special attention to damage resulting from the feeding operations of these creatures. Their numbers and capacity for consumption of marsh plants are made clear. The ecological consequences of the damage are fully discussed as are also its relations to the cattle industry and to muskrat and other wildlife management. Authors' summary: "A type of marsh damage, locally known as 'eatout,' is the normal consequence of the intensive feeding habit peculiar to blue and snow geese. Similar damage results when muskrats are allowed to overpopulate their habitat either through cessation of trapping or improper trapping. This damage disturbs the normal ecology of the marsh; and its consequences may advance efforts at marsh management in some instances but more often menace the profitable operation of the Gulf Coast marshes.

"Muskrat 'eatouts' have more drastic consequences than goose 'eatouts,' which are usually repaired quickly by natural vegetation, while the former often produce worthless climax marsh. Goose 'eatouts' disrupt muskrat and cattle management programs by interfering with trapping and by destroying cattle forage. Muskrat 'eatouts' are inimical to profitable fur management, but have not affected cattle lands recently. Both types of damage benefit certain forms of wildlife, but goose 'eatouts' have greater wildlife values and produce fewer harmful results to wildlife habitat. Encouragement of goose 'eatouts' within certain limits is, therefore, an appropriate management measure for wildlife refuges. Muskrat 'eatouts' should not be encouraged on refuges dedicated to wildlife management in this region." Bibliography of 12 titles. A valuable paper with a high content of original information.

Food Habits: Nutritive value of deer browse

Einarsen, Arthur S. Crude protein determination of deer food as an applied management technique, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 309-312, 4 tables.

Persistent small size and winter losses among black-tailed deer in some Oregon habitats suggested the desirability of studying and comparing them with areas less deficient. Predation and disease were quickly eliminated as basic reasons for the deer losses and an important lead to better understanding seemed to lie in the protein variation in preferred deer foods. The protein content varied both seasonally and locally; the findings are recorded in text and tables. Author's conclusions: "These investigations of deer habit and survival clearly define good black-tailed deer habitat as those areas upon which high protein browse grows and persists well into winter. Such range is not greatly limited in Oregon as logging and seasonal fires, both accidental and slash, release vast acreages yearly. That their use is definitely a management necessity if stability in production is to be maintained for blacktails, has been determined in this study. Protein analysis is a useful tool in this relationship. In conclusion, protein analysis has been found to be a valuable aid as a wildlife technique on this western range since it determines specifically the food values or lack thereof on occupied habitat. The problem of management then is to redistribute deer to suitable ground. This cannot be done instantly. It can be accomplished by continued field attention and the planning of harvests to exert hunter pressure where needed and thus forcing deer from poor to good habitat where effective regulations can be used."

Food Habits: Utilization of bitter cherry and serviceberry

Bond, R. M. Bitter cherry and serviceberry as food for birds, Condor (W. Lee Chambers, Robinson Road, Topanga, Calif. 50 cents a copy), 49(1), Jan.-Feb. 1947, p. 37.

Observations at Portland, Oregon, of birds feeding on the fruit of Prunus emarginata and Amelanchier florida (4 species on each).

Food Habits: Utilization of woodland plants

Olmsted, Norwood W., and James D. Curtis. Seeds of the forest floor, Ecology (Prince and Lemon Sts., Lancaster, Pa. $1.50 a copy), 28(1), Jan. 1947, pp. 49-52, 4 tables.

Contains useful information on the kinds and abundance of seeds found in litter in both softwood and hardwood stands in Maine, and a tabulation of the number of animals and birds known to utilize the plants, seeds of which were identified.

Food Habits: Value of marsh and aquatic plants

Davison, Verne E. Water weeds for sale, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 95-96.

A crusading article, the message, if not all of the details upon which it is based, may be accepted, namely, that "It is time that the duck experts, fish culturists, and aquatic nurserymen got together to put more quality and less trouble in wildlife waters." The reviewer is no specialist on the relations of plants to fishes but suspects that the arguments on that subject in this paper apply mainly to highly managed ponds. At least in the wild, cover values are important and these are often afforded by the leafy plants which Davison deprecates.

Among plants that "interfere with suitable duck foods and therefore should never be bought, sold, or planted," he includes lotus, white waterlily, and spatterdock. In the Kansas City region, the reviewer has seen as good wildfowl feeding ground as could be wished that was occupied by a growth of emergent lotus (excellent cover), beneath which the floating duckweeds and submerged Potamogeton and Naias grew luxuriantly. It should not be forgotten also that some of the waterlilies thrive in acid and peaty waters, for the improvement of which no great variety of plants is available. Their seeds also are not a negligible source of waterfowl food.

Davison lists among plants of "questionable use" banana waterlily and watershield. The remarks just made apply to them and further, seeds of watershield are the duck food in many southeastern ponds and small lakes which are the stronghold of ring-necked ducks in their winter range. As to the banana waterlily, in the best duck-feeding lake I ever saw (Lake Surprise, Texas), it was of equal value to sago pondweed. In a recent Audubon Magazine (see abstract, p. 43), John V. Dennis says of this waterlily, "its bananalike tubers are eagerly consumed by ducks" in the Mississippi Delta.

Food Habits: Of antelope

Couey, Faye M. Antelope foods in southeastern Montana, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, p. 367, 1 table.

Report on analyses of samples of the stomach contents of 24 animals killed in fall. The principal foods were browse, sage (Artemisia), buckbrush (Symphoricarpos), and snakeweed (Guterriezia) leading. All items are tabulated and discussed.

Food Habits: Of bobcat

Dill, Herbert H. Bobcat preys on deer, Journ. Mammalogy (Ernest T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 28(1), Feb. 1947, p. 63.

Lynx rufus on Odocoileus hemionus, Nevada.

Food Habits: Of coyote

Cahalane, Victor H. A deer-coyote episode, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 28(1), Feb. 1947, pp. 36-39.

A mule deer doe overcome by 3 coyotes; attack of surviving herd members on the predators; dissension of the animals over the carcass. A detailed eye-witness account; Arizona.

Food Habits: Of fox, gray

Turcotte, W. H. Analyses show foxes prefer fruits, insects, Southern Outdoors (Pryor and Auburn Sts., Atlanta, Ga. 10 cents a copy), 7(12-13), Jan. 1947, p. 3.

Report on seasonal foods in Mississippi as demonstrated by examination of 88 stomachs and droppings. No remains of game birds were found; prominent food items were insects, wild fruits, and small birds.

Food Habits: Of geese

Glazener, W. C. Food habits of wild geese on the Gulf Coast of Texas, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, pp. 322-329, 1 fig., 3 tables.

The area investigated is defined and mapped and its vegetation briefly described. Field observations are reported and the results of stomach analyses tabulated and discussed. Material relating to the different species of geese is not separated except in references to literature, 9 titles of which are cited. Omitted is "Notes on Chen caerulescens, Chen rossi, and other waterfowl in Louisiana" (Auk, 1910: 337-339). Author's summary: "Wintering geese in the coastal region of Texas ordinarily have a regular daily feeding schedule, making one trip to the feeding grounds in the early morning and another in the late afternoon, with a midday rest period at a waterhole. Food materials from 117 geese were entirely plant materials, including 51 species of flowering plants and an alga. More than 66 per cent of the identified material was of grasses (Graminae). Rice, corn, and grain sorghums were the cultivated crops most commonly and extensively taken, and practically all the grain so taken was waste picked from the ground. Saltgrass, water cress, and panic grass were the native species most extensively consumed by geese. Succulent winter crops of flax and winter truck are sometimes eaten by geese and eventually may require protection at times."

Food Habits: Of grouse, ruffed

Scott, Walter E. Red-bellied snake in ruffed grouse crop, Auk (Frederick C. Lincoln, Fish and Wildlife Service, Dept. of the Interior, Washington 25, D. C. $1.00 a copy), 64(1), Jan. 1947, p. 140.

Storeria occipitomaculata in Wisconsin.

Food Habits: Of hawk, duck

Stophlet, John J. Crow killed by a duck hawk, Wilson Bul. (Josselyn Van Tyne, University of Michigan Museum, Ann Arbor. 50 cents a copy), 58(4), Dec. 1946, p. 217.

Taking a young bird from the nest; Michigan.

Food Habits: Of lizards

Knowlton, George F. Feeding notes on two small lizards, Herpetologica (Chapman Grant, 2970 Sixth Ave., San Diego 3, Calif.), 3(4), Nov. 1946, pp. 143-144.

Quantity of food taken and rate of digestion in captivity, also notes on food habits at liberty of: Sceloporus g. graciosus and Uta s. stansburiana.

Food Habits: Of lizards

Knowlton, George F., and Wm. P. Nye. Lizards feeding on ants in Utah, Journ. Economic Entomology (E. N. Cory, College Park, Md. 75 cents a copy), 39(4), Nov. 1946, p. 546.

Summary of economic status of ants, which are "undesirable from the stand point of crop and livestock production in Utah." Tabulation of ants found in 1,462 stomachs of 16 species and subspecies of lizards, averaging more than 100 to a stomach. Comment on the food habits of the different forms, especially in relation to ants. "Insectivorous lizards are of importance in the biological control of ants in many range areas of Utah."

Food Habits: Of opossum

Taube, Clarence M. Food habits of Michigan opossums, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 97-103, 1 fig., 1 table.

Recent northward extension of range by the opossum is described and the methods of the study and the results of analyses of stomach and intestinal contents are tabulated and discussed. Author's summary: "(1) The opossum has extended its range and increased in numbers in many parts of the northern states within recent years. This change has stimulated discussion as to its effect on other wildlife in the new range; (2) in 1941 and 1942 the food of Michigan opossums was studied, 55 autumn-caught specimens being examined. In addition, the data on 78 other autumn-caught animals and eight spring-caught animals were examined and compared with findings made by the writer; (3) this study showed the opossum to be omnivorous, but exhibiting preference for animal foods. Stomach analysis revealed the proportion of approximately four-fifths animal food and one-fifth plant food; (4) analyses of stomach and intestinal contents failed to support claims by hunters that opossums are highly detrimental to rabbits and pheasants." Bibliography of 12 titles. A notable contribution on a somewhat neglected species.

Food Habits: Of owl, barn

Evans, Francis C., and John T. Emlen, Jr. Ecological notes on the prey selected by a barn owl, Condor (J. Lee Chambers, Robinson Road, Topanga, Calif. 50 Cents a copy), 49(1), Jan-Feb. 1947, pp. 3-9, 2 figs., 4 tables.

Authors' summary: "Pellets of a Barn Owl at Davis, California, were collected from January, 1942, through January, 1943. The hunting range of the owl included 140 acres of open fields and 25 acres of wooded creek bank. A total of approximately 280 pellets was collected: these contained 749 separate food items, of which mammals comprised 95.5 per cent, birds 2.5 per cent, and insects 2 per cent. All the species represented were nocturnal except for the birds; these latter may well have been caught on or near their night roosts. Animals typically associated with wooded or brushy cover comprised 57 per cent of the total food items, while open field habitats contributed 43 per cent. Woodland inhabitants, notably house mice and deer mice, were heavily represented at first but were much reduced at the end of the study period; the house mouse decrease corresponded roughly with an observed population reduction in the area. Pocket gophers and meadow mice, field-dwelling species, reached their maximum representation in the late autumn and early winter. An estimate of the bulk contribution of each prey species indicated a total consumption by the owl of approximately 126 pounds of food during the period of study, or roughly one-fourth of its body weight per day." Bibliography of 7 titles.

Food Habits: Of owl, barn

Tomkins, Ivan R. Nesting of the barn owl on the lower Savannah River, The Oriole (Eugene P. Odum, LeConte Hall, Athens, Ga.), 11(4), Oct. 1946, pp. 59-63, 1 pl.

Notes on life-history, especially on food habits; "each pair of owls is highly individual in feeding habits and in choice of food species."

Food Habits: Of pheasant

Hiatt, Robert W. The relation of pheasants to agriculture in the Yellowstone and Big Horn river valleys of Montana, Montana State Fish and Game Commission (Helena), 72 pp., 14 pls., 8 figs., 15 tables. 1946.

A Pittman-Robertson project, most of the field work of which was carried on by William and Ruth Bergeson. A tabular summary is presented of several earlier studies of pheasants in relation to agriculture in which findings were reported in percentages, and a few other publications on the subject are noted in the text. The bibliography includes 18 titles. The agriculture, climate, and pheasant population of the study area are commented upon and the methods of the study are set forth. A new specific gravity method is described which reduces volumetric measurement of stomach contents "to a constant which withstand repetition by other investigators." The economic classification of food items and the results of field observations and stomach analyses are discussed and tabulated in detail. Graphs compare the representation of food groups in the

stomachs by frequency of occurrence, number, weight, and volume (results by the last two criteria being nearly identical). Ingeniously illustrated charts show the numerical proportions of the principal food items in stomachs collected in each month and for the entire year. Economic relations of the pheasant are discussed and reduced to the form of graphs. Suggestions are made as to farming methods for avoiding damage. There are a summary and appendixes listing the food items by English and technical names, and showing their percentage of occurrence, and when feasible the number eaten. From author's summary: "Beneficial influences of pheasants on agriculture and the agricultural community--direct, indirect, and intangible--are at least equal to and probably outweigh the negative values. Isolated areas, however, sustain considerable local damage by pheasants. Local control of pheasant populations in areas where damage is reported can best be accomplished by live-trapping during the winter months. These trapped birds may then be released in more desirable areas. Efforts should be made to place farmer-sportsman cooperation upon a higher level of attainment, because one of the chief objections of the farmer to the presence of pheasants is that a few thoughtless, selfish, or vicious hunters exhibit little or no respect for the property rights of the landowner. Until this type of 'sportsman' is eliminated and until the laws permit greater control by the farmer over trespassers upon his land, little decrease in the number of posted farms may be expected."

An excellent paper, which sets a new standard in its field, particularly in its thorough digest of the information gathered and in its illuminating charts and graphs.

Food Habits: Of pheasant

Rossbach, George B. Food habits of the ringneck pheasant, Wisconsin Conservation Dept. (Madison 2) Publ. 326, A-46, pp. 149-184, tables. 1946.

Information on the food in crops or gizzards of 353 Wisconsin pheasants treated by seasons and localities. The volumetric system is used. General discussion relates to the birds' feeding on cultivated grains; seeds of weeds, legumes, skunk cabbage, and cucurbits; nuts; fleshy fruits; sumac fruits; leaves; rootstocks and tubers; miscellaneous vegetable food; and insects, and animals other than insects, especially snails. The foods of winter and spring, the critical seasons, receive special consideration. In the tables, identifications are recorded to the species for most plant foods, but only to the genus or some larger group for the animal items. In summary, economic values and pheasant environment are discussed.

Food Habits: Porcupine damage

Spencer, Donald A. A forest mammal moves to the farm--the porcupine, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 195-199.

Man's efforts at control of porcupines have not been very successful and in wooded regions the animals are invading farms. They are damaging farm trees, including those in orchards, and grain crops. Farm animals get some of the

quills in their noses and mouths, requiring surgical attention. Objects containing salt or grease are gnawed, as handles of tools and farm implements; synthetic rubber tires also are chewed. In New Hampshire, some $127,000 have been disbursed for bounties on porcupines over a period of 26 years.

Food Habits: Of skunk

Chapman, Floyd B. An interesting feeding habit of skunks, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 27(4), Nov. 1946, p. 397.

Taking carrion beetles, butterflies, and other insects attracted by feces of its own kind and other mammals.

Food Habits: Of sparrow, sage

Knowlton, George F., and Wm. P. Nye. Some insect food of the sage sparrow, Journ. Kansas Entomological Soc. (Donald A. Wilbur, Kansas State College, Manhattan. 75 cents a copy), 19(4), Oct. 1946.

Numerical report of the insects identified from 45 Utah stomachs. In a wide variety, Hemiptera predominated.

Food Habits: Of tortoise, box

Latham, Roger M. The common box turtle, egg predator?, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg. 10 cents a copy), 17(9) Dec. 1946, p. 30, 1 fig.

From experiments with captive animals, the author concludes that Terrapene carolina breaks eggs only "by crushing them between its jaws, and consequently any egg too large to be taken into its mouth cannot be broken by it." Only the eggs of the Hungarian partridge and the bobwhite among Pennsylvania upland game birds are likely to be eaten by this turtle.

Food Habits: Of vulture, black

Hagopian, Ralph V. Black vultures and live prey, Auk (Frederick C. Lincoln, Fish and Wildlife Service, Dept. of the Interior, Washington 25, D. C. $1.00 a copy), 64(1), Jan. 1947, p. 132.

New-born pigs in Florida.

Food Habits: Of vulture, black

Lovell, Harvey B. Black vultures kill young pigs in Kentucky, Auk (Frederick C. Lincoln, Fish and Wildlife Service, Dept. of the Interior, Washington 25, D. C. $1.00 a copy), 64(1), Jan. 1947, pp. 131-132.

Also references to four other accounts.

Food Habits: Of woodpecker, pileated

Moore, G. E. The pileated woodpecker, Missouri Conservationist (Missouri Conservation Commission, Jefferson City), 7(11), Nov. 1946, p. 14, 1 fig.

Vernacular names; habits; food, especially ants.

Life Histories: Bat, Big-eared

Dalquest, Walter W. Notes on the natural history of the bat Corynorhinus rafinesquii in California, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 28(1), Feb. 1947, pp. 17-30, 1 fig., tables.

Description, variation, distribution in California (text and map), technical account of 3 subspecies, daytime retreats, flight, resting at night, breeding, young, hibernation, dormancy, parasites. Bibliography of 5 titles.

Life Histories: Bear, Black

Bradt, G. W. The black bear--buffoon of the north woods, Michigan Conservation (Michigan Dept. of Conservation, State Office Bldg., Lansing), 15(11), Dec. 1946, p. 5, 1 pl.

Characteristics, life history, food habits, and winter retirement. The animal appears to be maintaining its numbers in Michigan, where about a thousand were killed in the 1945 hunting season.

Life Histories: Bear, Black

Chapman, Floyd B. Ohio's black bears, Ohio Conservation Bul. (1106 State Office Bldg., Columbus 15. 10 cents a copy), 10(3), March 1946, pp. 12-13, 2 photos, 1 drawing.

The animals persist in (or have returned to) extreme southern Ohio; notes on their food and other habits there; they should be protected.

Life Histories: Bobwhite

Scott, W. E. The bobwhite quail (Colinus v. virginianus), Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison), 11(12), Dec. 1946, pp. 24-26, 2 figs.

Review of occurrence of the bird in the State and of the population studies carried on near Prairie du Sac (a map indicates relative densities of distribution); sketch of the life history; and management suggestions.

Life Histories: Coyote

Robinson, Weldon B., and Maynard W. Cummings. Notes on behavior of coyotes, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 28(1), Feb. 1947, pp. 63-65.

Coyotes being harassed by big game; association with badgers; swimming; formation of packs.

Life Histories: Fox, Red

Bradt, G. W. Red fox--wise guy of the wild, Michigan Conservation (Michigan Dept. of Conservation, State Office Bldg., Lansing 13), 16(2), Feb. 1947, p. 4, 1 pl.

Popular life history, dwelling on the fox's adaptability, characteristics, food habits, reproduction, habitat, economic value, and control when over-abundant.

Life Histories: Hare, Snowshoe

Bradt, G. W. Snowshoe hare--Turncoat of the snow lands, Michigan Conservation (Michigan Dept. of Conservation, State Office Bldg., Lansing 13), 16(1), Jan. 1947, p. 4, 1 pl.

Popular account stressing pelage changes and cycles and dealing less fully with food, habits, and economic value.

Life Histories: Hawk, White-tailed

Stevenson, James O., and Logan H. Meitzen. Behavior and food habits of Sennett's white-tailed hawk in Texas, Wilson Bul. (Josselyn Van Tyne, University of Michigan Museum, Ann Arbor. 50 cents a copy), 58(4), Dec. 1946, pp. 198-205, 3 photos.

Discussion of range, general behavior, nesting, and especially food and feeding habits, presenting far more information than has previously been made known for this species. Bibliography of 10 titles.

Life Histories: Moles

Olive, John R. Economic importance of moles, Ohio Conservation Bul. (Division of Conservation, 1106 State Office Bldg., Columbus, Ohio. 10 cents a copy), 10(12), Dec. 1946, pp. 4-5, 3 photos, 1 map.

Kinds of moles and their distribution in Ohio (mapped), characteristics, life history, food, damage, and control methods; preparing skins for the market.

Life Histories: Muskrat

Hensley, Arthur L., and Howard Twining. Some early summer observations on muskrats in a northeastern California marsh, California Fish and Game (Ferry Bldg., San Francisco 11, Calif.), 32(4), Dec. 1946, pp. 171-181, figs. 41-45.

Report on a Federal aid project. Notes on methods of marking the animals, of which toe clipping was most satisfactory. Characteristics and use of the houses are described; they serve also as nesting sites for various water birds. Life history topics treated include: mating, care and growth of young, senses, mortality, and predators. The contents of the paper are discussed and summarized. "Sixty houses were kept under close observation; 35 of these were occupied by 40 muskrat litters containing 187 young, or an average litter of 4.67."

Life Histories: Pheasant

Buss, Irven O. Wisconsin pheasant populations, Wisconsin Conservation Dept. (Madison 2), Publ. 326, A-46, pp. 1-148, frontispiece + 18 plates, 15 figs., 36 tables. 1946.

Report on a Pittman-Robertson project. The introduction (pp. 15-25) by Aldo Leopold and W. F. Grimmer gives the history of pheasant plantings in Wisconsin, including releases by the State Conservation Department 1929-45; source of the stock, embracing 4 or 5 subspecies; range of the pheasant in the State as shown by kill in 1942; results of restocking; damage by pheasants; and future needs in their management, especially in assuring good distribution of adequate winter cover. The main part of the work is divided into 13 chapters here partially listed and very briefly abstracted. Nesting studies: Hayfields were much used and losses from mowing were great; renesting was characteristic; nest hunting did not increase predation; some spring-released hens nested the same year. Sex ratios (in the grand total, 1:4.5) varied seasonally and indicated a disproportionate loss of hens in winter. The bursa of Fabricius was found to be a valid character for identifying birds of the year. Molt: The post-juvenile molt of the primaries was found dependable in indicating the age of pheasants from 4 to 16 weeks. Survival: The rate for wild birds was 2-3 times that of propagated pheasants and except where reared birds were released during the hunting season, wild pheasants predominated in the kill. Of pen-reared birds, 34 percent survived to the fall hunting season, 3 percent or less to April, and only one percent from one year to the next. Violent methods of release resulted in higher losses of stock; the birds should be accustomed to natural foods before release or should be supplied for some time with the feed to which they have become accustomed. Turnover: In a protected population, each year class shrunk to zero by the fifth winter; in an unprotected one, the course was only four years. The rate of mortality decreases with age. Movement: "These studies indicate that wild pheasants show little or no movement beyond a quarter-mile, but artificially-propagated pheasants may disperse up to seven miles, and in some cases it may be in large numbers." Kill returns from Dunn County in 1941 and 1942 showed that about two-thirds of the bag was wild cocks; crippling losses were about 9 percent. There are some interesting miscellaneous findings, a 2-1/2 page list of literature cited, and a full index.

A compendium of intelligently directed research--the kind of information upon which management should be based. An appended paper on food habits by George B. Rossbach is separately abstracted (p. 23).

Life Histories: Pocket gopher

Miller, Milton A. Reproductive rates and cycles in the pocket gopher, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 27(4), Nov. 1946, pp. 335-358, 6 figs., 9 tables.

A thorough study, competently discussed; subject, Thomomys bottae navus. From author's summary: "On cultivated (irrigated) lands in the Sacramento Valley, California, pocket gophers may breed continuously, with three periods of increased fertility (breeding seasons) in spring, summer, and early winter. Year-long breeding is shown by the occurrance of ovulating, pregnant, post-partum, and suckling females, and of small recently-weaned juveniles in every season. Three marked breeding seasons are demonstrated by peak periods in incidence of the above-named types of individuals following each other in natural sequence. The main breeding season is in spring, reproduction then being of longer duration and greater intensity than at other times of year. Summer breeding is mainly by small-sized (young) females, possibly those born in the preceding spring. Little breeding occurs during the autumn. The winter breeding season is variable and in some years may merge with the vernal season. . . . The average adult female is potentially capable of producing more than three broods per year as determined by intensity of ovulation. Estimates of the annual number of broods, based on actual breeding performance, range between 1.5 and 2.5 per adult female. The number of young per litter is estimated between 5.77 ± 0.21 (mean number of small embryos per female) and 4.92 ± 0.15 (mean number of fetal sites in post-partum females). The statistically significant decrease in numbers of embryos with advance in pregnancy is attributed to fetal death and resorption in utero. Estimates of gross rates of increase in pocket gophers range between 7.6 and 14.1, with an average of 10.7 young per adult female per year." Bibliography of 23 titles.

Life Histories: Puma

Young, Stanley P., and Edward A. Goldman. The puma. Mysterious American cat (Wildlife Management Institute, 822 Investment Bldg., Washington 5, D. C. $4.00 a copy), xiv + 358 pp., 93 pls., 6 figs., 13 tables. 1946.

Mr. Young has combined gleanings from an exhaustive search of the literature with the findings of himself and other members of the Fish and Wildlife Service in a comprehensive account of the puma in both North and South America. He deals with early records, names of the animal, the puma in Indian lore, its habits and characteristics, parasites and diseases, economic status (with special emphasis on food habits), and hunting and control. The author ends by saying of the puma: "May it long survive in many of the wilder parts of the Western Hemisphere where there is little, if any, reason for adopting measures of control." Mr. Goldman traces the history of the taxonomy of pumas, discusses the characters found useful in classifying these cats, and geographic

and individual variations. He lists the 30 subspecies recognized with their type localities and gives a map showing their approximate ranges. Then follow technical descriptions of the genus, species, and the subspecies, accompanied by synonymy, statement of range, and historical notes. Greatest dependence is placed upon characters of the skull which are fully illustrated. There is a 50-page bibliography and full index.

A companion work to that on wolves by the same authors (see WILDLIFE REVIEW, No. 41, Nov. 1944, p. 54) like which it advances and consolidates knowledge to a point hitherto unapproached.

Life Histories: Raccoon

Mosby, Henry S. The raccoon, Virginia Wildlife (Virginia Commission of Game and Inland Fisheries, Richmond 13. 10 cents a copy), 8(2), Feb. 1947, pp. 8-9, 20, illus.

Appearance, distribution, habits, food, economic value, management.

Life Histories: Shrew, Short-tailed

Pearson, Oliver P. Scent glands of the short-tailed shrew, Anatomical Record (Wistar Institute, Philadelphia, Pa.), 94(4), April 1946, pp. 615-629, 2 pls.

A discourse on the structure of these glands and upon experiments to determine their function. "It is suggested that the scent glands help each shrew to establish its territory, thus serving to keep individuals separated except during the breeding season." Bibliography of 21 titles.

Life Histories: Turkey

Dalke, Paul D., and David L. Spencer. Some ecological aspects of the Missouri wild turkey studies, Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D.C. $1.00 a copy), pp. 280-285.

In discussing distribution and abundance, the authors note that in a little less than a century the wild turkey was extirpated from 83 percent of its original Missouri range. "Yet in the past few years, intensified efforts at management and closure of the hunting season have led to a moderate upswing in the turkey population." Correlation of soil fertility and turkey production does not operate as the birds, being evicted by farming, are now most numerous on the lands that are least used for agriculture. Overgrazing and burning are especially damaging to remaining turkey habitat. Logging always drives the birds away. Winter flocks are of mixed broods and sexes though the older gobblers tend to segregate. Flock ranges overlap and a flock may work over a broadly elliptical area 4-5 miles long. The authors comment on gobbling territories, laying, incubating, and hatching, and limiting factors, including predators. "Although there is now no turkey season in Missouri, man still causes a larger drain on the wild turkey population than all its natural enemies combined." Bibliography of 6 titles.

Life Histories: Turkey

Murie, Adolph. The Merriam turkey on the San Carlos Indian Reservation, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, pp. 329-333, 2 tables.

Arizona. Characteristics of the area; numbers of turkeys as affected by past and present hunting pressures; general habits of the birds; tabulation and discussion of food items represented in 24 crops and 43 droppings. "Because of the heavy cattle grazing at San Carlos, the range possibly cannot now carry the large number of turkeys present in the early days. The availability of turkey food plants such as grasses would be much reduced by close grazing. However if acorns, pine seeds, and juniper berries are the principal winter foods, the carrying capacity may not have been greatly diminished. Heavy grazing actually may have increased some food plants, such as ragweed. With proper control of hunting, a large turkey population can be maintained on the San Carlos Indian Reservation."

Management: Attracting birds

Henkel, Mathilde. Planting for our winter birds, Flicker (Severena C. Holmberg, 4827 Woodlawn Blvd., Minneapolis 6, Minn.), 18(4), Dec. 1946, pp. 85-89.

Recommendations for Minnesota of shrubs and trees of ornamental or other landscaping value that provide cover and food for birds, with notes on their utilization.

Management: Beaver

Harris, Dave, and Shaler E. Aldous. Beaver management in the northern Black Hills of South Dakota, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, pp. 348-353, 1 pl., 2 tables.

History of beavers in the region and of early and present-day trapping. Once nearly exterminated, the animals have been restored by transplanting to prepared sites and by well-planned management. These operations are described. A live trap is illustrated and trapping for fur under State control is described.

Management: Bobwhite

Davison, Verne E. False principles delay advancement in wildlife techniques, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, pp. 296-299.

An iconoclastic paper, doubtless correctly reporting observations of the author and associates but not necessarily disproving contrary experiences of others. That quail in some instances do take time to accept new foods regularly is clearly pointed out in "The Bobwhite Quail" (Stoddard, et al., 1931, pp. 125-126). Evidence as to the differential utilization of the seeds of Lespedeza

sericea and L. bicolor is of interest and value to wildlife managers, but should not inspire sweeping generalizations on the feeding habits of quail in general. Again, the author's remarks on "edge" deal with woodland margins, "sometimes grazed", and adjoined by clean-cultivated fields. Under such unnatural conditions, the phenomena of edge are, of course, not well displayed, but that does not call for condemnation of the theory of edge. The reviewer has pointed out at various times that edge effects are light effects. Any thinning or opening of the tree canopy admits more light, which stimulates undergrowth and results in increase in variety and quantity of cover and food. Edge effect may thus be produced within a woodland. The term has a certain usefulness but it has been misunderstood and misapplied. (See abstract of Linduska's paper, this issue of WILDLIFE REVIEW, p. 11.) Perhaps we would get along best by using the earlier and better understood terminology as to light effects. The author deprecates game censuses and places more dependence on observation of the practical results of management. A great deal depends upon what is sought; sometimes a blunt tool will do the work, at others a sharp one is required. There is brief comment on the carrying capacity of quail lands, which shares the general tendency of this paper to set up straw men for the fun of knocking them down.

Management: Canadian Wildlife

Lewis, Harrison F. Management of Canada's wildlife resources, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 11-17.

Wildlife management is important in Canada because "more than 90 per cent of the area of the Dominion produces wildlife and on about two thirds of the country's area wildlife is the most valuable permanent crop and, because of natural conditions, is likely to continue to be so." The division of responsibility for wildlife between the Provinces and the Dominion is defined. The need of trained men of innate wildlife interests is stressed and the value of cooperation between Canadian, Usonian, and British agencies is highly appraised. So important are wildlife population "cycles in Canada, that every effort must be made to learn more about them, not only that they may be forecast accurately, but also in order to explore all possible means of controlling them." Special care is taken to preserve threatened species; of these the trumpeter swans now number about 900; whooping cranes and eastern woodland caribous have continued to decrease despite protective measures; antelopes (about 30,000) are not in special danger. Increase of beaver and muskrat production has been successful and profitable. Encouragement of the eiderdown industry, found valuable as a conservation measure, is to be extended. Overpopulations of white-tailed deer, elk, and bison have been controlled. Management of hunting and trapping on preserves in the Northwest and in Yukon Territories is explained. Waterfowl conservation is discussed; regardless of aid to the birds, the results of the 1945 breeding season were not encouraging. The author comments on hazards to wildlife from increasing civilian air traffic.

Management: Cover

Damon, David. Seasonal relationships of bobwhite quail to woody vegetation in Nebraska, Nebraska Bird Review (Edson Fichter, University of Nebraska State Museum, Lincoln. 50 cents a copy), 14(2), July-Dec. 1946, pp. 34-36, 1 table.

Report on a study of flushing distances from woods and hedges by seasons and discussion of the results. Hedges are more numerous and more widely distributed than woods, a fact reflected in the lower average flush-distance from them. Weed cover is much used in fall but in winter the birds move closer to wooded areas. "The chief missing item in otherwise good quail range in Nebraska is apparently suitable woody field borders. Osage orange, while an excellent species for quail range is unpopular with most landowners. Other woody species will need to be used if we are to succeed in quail range improvement."

Management: Elk, Yellowstone

Sharritt, Grace V. Home-coming of the elk, Audubon Magazine (1006 Fifth Ave., New York 28, N. Y. 45 cents a copy), 48(6), Nov.-Dec. 1946, pp. 348-354, 4 photos, 1 map.

Popular account of the animals that winter on the National Elk Refuge, Jackson, Wyoming.

Management: Environmental improvement

Gabrielson, Ira N. Changing concepts of wildlife management, Missouri Conservationist (Missouri Conservation Commission, Jefferson City), 7(11), Nov. 1946, pp. 3-5, 12, 4 illus. (one a photo of author).

Regulated hunting, restocking, and maintenance of refuges, all have had thorough trials but of themselves do not insure continued production of shootable game. While each of these methods has its place and each doubtless will be used in future game programs, improvement of environment is a superior, as well as an economical, measure. Application to the management of a quail population is discussed. Restocking in any form would be done only in emergencies, or if plenty of money were available, birds would be released just prior to the hunting season. However, propagated birds are costly and hunting license fees nominal. Hence the hunter cannot expect much planting ahead of the guns unless fees are materially raised. Under present conditions, the cheap natural production of game is most feasible. It is greatly aided by soil conservation practices which hunters should support.

Management: Farm game

Glading, Ben. Upland game birds in relation to California agriculture, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 168-172, 1 map (range of pheasant).

Agricultural conditions affecting pheasants; the birds thrive only where there are grain crops and summer moisture. Irrigating and mowing practices that cause nesting losses may possibly be modified. In highly valued irrigated and other lands, little can be done to favor game and even on "grazing lands, ranchers are loath to cooperate with hunters generally." On the other hand, fee systems are not popular with the gunners. "In summary, our knowledge of methods of encouraging upland game in California is far in advance of our means of getting this management into practice."

Management: Farm Wildlife

Callison, Charles. Wildlife management in balanced farming, Missouri Conservationist (Missouri Conservation Commission, Jefferson City), 8(1), Jan. 1947, pp. 1-3, 14-15, 3 photos.

The purpose of balanced farming is to put every bit of land to the use for which it is best suited, at the same time maintaining or increasing fertility. Whether the soil and water conservation practices required are beneficial to wildlife is the theme of this paper. Hedge removal or conservation, installation of grass-lined waterways, pasture improvement, pond construction, and elimination of overgrazing are among the topics considered. "Any broad program of soil conservation cannot help but benefit wildlife in the long run."

Management: Farmer-sportsman relationship

Poirot, Eugene M. A farmer looks at wildlife management, Missouri Conservationist (Missouri Conservation Commission, Jefferson City), 8(2), Feb. 1947, pp. 1, 10-12, 3 photos (one a portrait of the author).

An intelligent and thought-provoking presentation of the farmer's point of view. "Better not try to shoot that owl! I know she does some damage, but I will protect her just like I would a flock of prairie chickens." As the soil becomes more fertile all life increases. "The extra birds take care of the extra bugs; the extra snakes, prairie owls, and mouse hawks take care of the extra mice and rodents." "Year ago a fellow killed a redbird in my hedge and thought it was a quail. Another bunch of hunters shot 20 times at a bunch of my barnlot quail. They got one bird but only four ever came back to my barn after that. You want me to conserve the game which does not belong to me, so someone can take it without even saying thanks. Those trees down there in my pasture are wild but they are mine. Those blackberries in that holler over there are wild but they are mine. How come the wild quail and the rabbits are yours?" Conclusions: "(1) On a farm wildlife increases as fertility increases provided farm management is in sympathy with wildlife development; (2) the whole scheme of soil conservation, wildlife restoration and agricultural production can and should be in harmony; (3) in order to accelerate wildlife restoration within these limits so far as the farmer's responsibility goes, it is necessary to generally establish confidence, give information through more agencies, and provide an incentive."

Management: Food patch refuges

Bishop, James S. Seed stock refuge investigation, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 382-391, 6 tables.

Report on a Pittman-Robertson project "intended to test the value of food patches of field corn, surrounded by small refuge areas, as a pheasant-management measure" in Connecticut. The investigation was carried on during three years existence of the refuges and one year each before and after their maintenance. Hunter take was selected as the index of pheasant productivity. It was sampled by questionary cards left under the windshield wipers of cars parked in the study area. From 69 to 85 percent of the cards were recovered with usable information. Simultaneous use of an interviewing system in one year indicated that the card method was about equally accurate. Summary of the car-card information and calculated data as to hunting pressure and success are tabulated. The proportion of propagated and naturally produced stock in the bags is calculated from reports of banded birds. In conclusion, the method of study is pronounced sound. As to the value of the feed patch refuges, "Management of this kind and intensity did not maintain the population of pheasants in the wild during the widespread reduction . . . in 1943."

Management: Forest management in relation to wildlife

Watts, Lyle F. Forests and forest wildlife in the postwar era, Trans. N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 36-42.

The forest situation and program are stated; recreational use of the forests, in part dependent upon wildlife, is increasing; forest management in relation to wildlife management involves problems both of understocking and of overpopulations; utilization of the wildlife crop; and improvement of habitat. Work of the Forest Service in each of these activities is briefly sketched. "The Forest Service, because it manages about one tenth of the land area of the United States, feels a particular responsibility . . . These lands are dedicated to a multiple-use management and in the years to come we hope to make significant progress on national forests in the challenging task of coordinating wildlife production with the other jobs of managing the land."

Management: Forest Wildlife

Butterfield, K. P. Cooperative multiple use land management, Virginia Wildlife (Commission of Game and Inland Fisheries, Richmond 13, Va. 10 cents a copy), 7(5), Nov. 1946, pp. 9-11, 4 photos.

On Virginia national forests; details of the plan as stated by Lloyd J. Swift; work done on the Jefferson National Forest; game censuses of 1940 and 1946 compared (all species increased). "Plim-soll Line" misused and misspelled; see dictionary; this term has nothing to do with wildlife. Appropriate words include "browse line" and "deer line".

Management: Forest wildlife

Cochran, A. R. Forests and game, Virginia Wildlife (Commission of Game and Inland Fisheries, Richmond 13, Va. 10 cents a copy), 7(1), July 1946, pp. 7-8, 10, 2 photos.

Cooperative wildlife management on national forests in Virginia; about 100,000 dollar stamps covering hunting privileges have been sold in 7 years; notes on wildlife management areas; purposes for which expenditures upon them are made--warden duty "the biggest and most pressing job"; environmental improvement; restocking with deer; recommendations for the future.

Management: Forest wildlife

DeLaBarre, Cecil F. Cooperative wildlife management in Virginia, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 313-322, 2 tables.

This report on the cooperative program between the Virginia Commission of Game and Inland Fisheries and the U. S. Forest Service is more comprehensive than the three others that appeared in Virginia Wildlife which are also here abstracted. The writer summarizes seven years development of projects on two national forests. He presents information on the geology, topography, climate, and flora and fauna of the areas. The history and nature of the cooperative agreements are set forth. Revenues for improvements from the sale of hunting stamps at a dollar each amounted to about $100,000 in the seven years. The objectives for which the money was spent are cited in some detail. Success has resulted in great part from the devotion of an excellent staff of resident wildlife managers. Development operations are itemized and partial censuses of wildlife on the forests tabulated. In conclusion the author says: "Future plans for the Virginia National Forests call for expansion of the present program of environmental improvement, better and more extensive law enforcement and stream improvements. It is hoped that ultimately it will be possible to place one full-time resident forest and wildlife manager on each 25,000 acres of National Forest land. More funds will be needed for this expansion, and I believe that they will be available, because of the high regard which Virginians have for the achievements of the Game Commission and the Forest Service in their cooperative efforts thus far. The Virginia program has demonstrated that real cooperation between a federal agency administering federal lands, and a state agency administering wildlife is not only possible but also highly productive of results."

Management: Forest wildlife

Fearnow, Theodore C. Forest wildlife in the postwar era, Virginia Wildlife (Virginia Commission of Game and Inland Fisheries, Richmond 13), 8(1), Jan. 1947, pp. 17-19, 3 photos.

"In wildlife, as in industry, the typical American approach is that of expanded production with resulting increase in opportunities for enjoyment by

all." As wildlife is a product of the land, "It is the good earth plus our husbandry which will, in the final analysis, win or lose for us the battle to maintain the American system of hunting and fishing." "Opportunities for accelerating wildlife production lie in two fields: (1) increased production on lands now available, and (2) the opening up of new production . . . on lands formerly neglected." So far as woodlands are concerned, "A proper tie-in between forests and wildlife would insure long-term availability of vast areas suited for hunting and fishing." Interest of the owner, private or public, must be enlisted and "in the case of private forest landowners it appears that some incentive . . . must be provided if the public interest is to prevail." An extension service is suggested. The author points out defects in much present-day eastern woodland for wildlife production, but indicates that properly directed timber cutting can contribute substantially toward a balanced environment for wildlife. Management practices in use in Virginia forests are outlined.

Management: Forest wildlife

Gabrielson, Ira N. Wildlife in wildland management, Journ. Forestry (825 Mills Bldg., Washington 6, D.C. 50 cents a copy), 44(11), Nov. 1946, pp. 829-833.

The author discusses useful wildlife species that do, and those which do not, interfere with primary forest uses nor with other species, and, in addition, species of mixed values that conflict with certain phases of forest management. The first category includes fishes, alpine species, and most forest birds; the second, deer, elk, beavers, and predatory fur animals; the third group contains seed-eating rodents and birds, burrowing moles and pocket gophers, and the seedling-destroying snowshoe hare. Illustrative experiences with these animals are described and increased research is advised.

Management: Forest wildlife

Hosley, Neil, Chairman. The status of Federal agencies in forest-wildlife management, Journ. Forestry (825 Mills Bldg., Washington 6, D.C. 50 cents a copy), 44(11), Nov. 1946, pp.897-902.

Report on land management activities that maintain or improve the forest wildlife habitat on the part of the Forest, National Park, Fish and Wildlife, Grazing, and Soil Conservation, Services, the Bureau of Reclamation, managers of Indian lands, and the Tennessee Valley Authority. There are also discussed: the research program related to wildlife, education and extension activities, management or demonstration areas where correlation of resource and wildlife management are practiced, and publications on wildlife and habitat management.

Management: Forest wildlife

Howard, Milford C. Wildlife management on the George Washington National Forest, Virginia Wildlife (Commission of Game and Inland Fisheries, Richmond 15, Va. 10 cents a copy), 7(4), Oct. 1946, pp. 18-20, 4 photos.

The cooperative program; duties of managers; environmental improvement.

Management: Forest Wildlife

Swift, Lloyd W. Forest-wildlife management looks ahead, Journ. Forestry (825 Hills Bldg., Washington 6, D.C. 50 cents a copy), 44(12), Dec. 1946, pp. 1044-1046.

The author reviews happenings of the past decade that have had an important bearing on wildlife management. [It is remarkable how much of the essentials of the present movement has been developed in that period.] Opportunities for education in this field have multiplied and public interest in wildlife has greatly increased. The relation to wildlife management of the personnel administering both private and public forests is discussed and suggestions are made as to production of wildlife on forested areas.

Management: General

Gabrielson, Ira N. What is coming for wildlife?, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 28-35.

The author contrasts advantages and disadvantages in wildlife management. Among the former he reckons: awakened interest in soil conservation; improved public opinion relative to wildlife; availability of well-trained wildlife technicians, including the return of many of them from the armed services; and the effects of previous work in this and related fields. "Disadvantages, perhaps they should be called additional problems" include: rise in hunting pressure; resurgence of selfish local interests; great projects for highway and river basin development; expansion of air transportation systems; and water pollution. Suggestions are made as to what can be done, or is being done, about some of these. "The conservation forces . . . have a big job in a somewhat confused and hectic world if past progress is to be maintained and further gains registered in the effort to obtain a wiser management and fuller utilization of our renewable natural resources."

Management: Grouse, Sage

Morse, Wm. B. Oregon sage grouse, Oregon State Game Comm. Bul. (1634 S.W. Alder St., Portland 8, Oreg.) 2(1), Jan. 1947, pp. 1, 3, 7, 2 photos, 3 tables.

Report on a Federal aid project. Sage grouse populations in Oregon have steadily declined and the State does not have any area where even light hunting can now be tolerated. The author found livestock activities beneficial, rather than injurious, to the birds. Their life history is sketched and limiting factors are discussed. Egg destruction by ravens and magpies appeared most important. On an area where these birds were eliminated, so far as possible, there was a 50 per cent nesting success while on a check, uncontrolled plot, it was only 5 per cent. Development of water supplies, of no value to the sage grouse, benefitted pheasants and Hungarian partridges.

Management: Inventory, antelope

Stuart, Russell W. North Dakota antelope census for 1946, North Dakota Outdoors (Capitol, Bismarck, N. Dak. 5 cents a copy), 9(7), Jan. 1947, pp. 13-14.

By airplane: methods and results. The sex ratio is about 1:4; the animals are slowly increasing; about 2,400 are now in the State. Increase has been due in considerable degree to protection by ranchers.

Management: Inventory, deer kill

Cronmiller, F. P. Probable errors in sample measurements of deer kill, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 103-104, 1 table.

The results of inspections as a guide to future management are biased by the tendency of hunters to submit a higher proportion of large than small deer for weighing and measurement. Author's conclusions: "(1) By the checking station method used, random samples of weights cannot be secured; (2) a simple measurement [antler beam diameter] that will correlate significantly with size will result in a much larger sample and will come much closer to actual distribution of size frequencies."

Management: Inventory, game kill

Barnes, Wm. B. The sportsman's questionnaire method of estimating the game kill in Indiana, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 339-347, 2 figs., 1 table.

Questionaries sent to a random sample of 1 out of 25 holders of hunting licenses or permits. About 40 percent were returned, of which a little more than one percent were unusable. Investigation proved that nearly 12 percent of the holders did no hunting. Calculations relative to bobwhites are presented to illustrate how the returns are used to estimate the kill. A graph shows the average number of several kinds of game bagged per hunt according to this inquiry. The cost was about $75 per thousand questionaries, not including follow-up activities. Author's summary: "The sportsman's questionnaire is a rather convenient method for collecting kill statistics, especially for states having limited funds. Like polls of popular opinion, it is based on a scientific selection of the sportsmen. Disadvantages are: the statistics are an estimate rather than the actual kill; reliability decreases with smaller samples, thus the average estimate of the woodcock kill is less reliable than the rabbit kill because of the small return from woodcock hunters. Advantages are: minimal costs, the gathering of information on a voluntary rather than a compulsory basis, less nuisance to the sportsmen, ease of compilation of small sample, and rapidity of method with final results available within 6 months or less after close of the hunting season."

Results by this method for 1945-46 are presented in an article by the same author in Outdoor Indiana, Sept.-Oct. 1946, where the calculated game-kill, and the average kill per hunting effort by species 1940-45 also are tabulated.

Management: Inventory, hunter numbers and activities

Wandell, Willet N. An intensive method of determining hunter numbers and activities, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 373-381, 4 figs., 2 tables.

Objectives and methods are described and the forms used are illustrated. Results and costs are noted. Author's summary: "(1) An intensive method of hunter census based on card reports was devised and used, 1940-43, on a 6,000-acre Massachusetts area during the course of an intensive investigation of ring-necked pheasant populations. It was used with modifications on a similar area in Connecticut and in Oregon; (2) hunters were divided into two groups: resident hunters, or those who resided on the study area or reached it on foot, and transient hunters, who arrived on the area by automobile or by other vehicles; (3) resident hunters were contacted before the hunting season and asked to keep detailed records of hunting activities on cards furnished them; (4) transient hunters were contacted or their cars were tagged with questionnaire cards to which a thumb tack and pencil were attached. These cards were filled out by the hunters and posted along roads from which they were collected by later patrols; (5) approximately four of every five cards distributed to transient hunters were returned with usable data. The accuracy of the information supplied, as indicated by field checks, was apparently high; (6) most resident hunters did not keep up-to-date hunting records on the cards supplied them without frequent reminders during the hunting season; (7) the cost of using this method in Massachusetts for a 30-day season (Sunday hunting excluded) was $0.053 per acre. The cost per square mile per day was, for the season, $1.29." Five titles of literature cited.

Management: Inventory, wildlife by soil types

Crawford, Bill T. Wildlife sampling by soil types, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D.C. $1.00 a copy), pp. 357-362.

Seeking simplicity and economy of inventory, the concept of soil types as game ranges was developed. The mapping and field methods used are noted, and the results of soil sample surveys discussed for various small game and for subject inquiries, as predation. Limitations are considered. Author's summary: "(1) Using 38 soil sample areas, located on all the major soil types of Missouri, an accurate yet brief method of sampling wildlife populations, harvests, and habitat conditions was derived; (2) these areas included 373,900 acres, or an average of 9,840 acres per area (15.45 square miles), and represented eight-tenths of one per cent of the total area of the State; (3) by cover mapping the soil sample areas and expanding the data to the acreage of each soil type, the first complete picture of actual acreages, locations, and conditions of vegetative types for the State were acquired; (4) the wildlife population, harvest,

and habitat data, when expanded to the area of the soil type, appeared to give satisfactory information; (5) its success depends primarily on the quality of censusing and interviewing conducted; (6) the soil sample data have also been used in preparing management plans. As the information is based on a soils concept, the plans are easily coordinated with those of other agricultural agencies; (7) additional work and refinements are necessary but this method of sampling appears the most feasible of those attempted in Missouri."

Management: Muskrat

Aldous, Shaler E. Muskrat trapping on Sand Lake National Wildlife Refuge, South Dakota, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 77-90, 2 figs., 7 tables.

Experimental trapping to determine policies in this field for national wildlife refuges. Description of the study area and of the investigation; report on food types and muskrat abundance, and the results of fall, winter, spring, and house, trapping, factors influencing the freezing of muskrat lodges, sex ratios, weights, size of the animals in relation to habitat, and movements. Author's summary: "Fall trapping is inferior to winter house trapping and spring trapping for the following reasons: (1) weather conditions are so variable that it is often difficult to get the job done within the specified time limits; (2) the trapping success is lower than by methods used in winter and spring; (3) the fall skins average smaller and are largely in a low degree of primeness, both of which reduce their value.

"Winter house trapping if properly done is an efficient method of harvesting muskrats. Shallow water areas should be trapped between December 15 and January 15. This would remove most of the animals from these areas before they are forced out and would prevent some damaged skins. Opening and closing houses during the winter is not detrimental if done properly and the house is in a good habitat. Muskrat activity is essential if the plunge hole is to be kept open during extremely cold weather. If a house is 'trapped out' or is deserted, nothing will prevent it from freezing during cold spells. Furs taken during the winter period demand a good price because they have reached a maximum size by February and the primeness increases until the end of February. During January, February, and March, the majority of the furs are three-fourths and fully prime.

"Spring trapping is the most efficient method of harvesting the muskrats but by the time this is possible the animals are breeding and a large percentage of the furs are damaged from fighting. The value of the skins is high due to maximum size and complete primeness but the damaged ones lower the average price materially.

"The sex ratio of animals trapped from houses during January was 64.2 per cent males and 35.8 per cent females. During the late summer live trapped animals averaged 53 per cent adult males and 47 per cent adult females. Immature animals averaged 60.7 per cent males and 39.3 per cent females. Based on 250 recaptures of tagged animals, 54.4 per cent showed no movement from place last released, 15.2 per cent moved 1 to 10 rods, 9.2 per cent 11 to 20 rods, 6 per cent 21 to 30 rods. Only 15.2 per cent moved more than 31 rods. The maximum distance recorded was 200 rods. Growth rates on small animals was somewhat less than that recorded for Iowa muskrats." Bibliography of 7 titles.

Management: Muskrats and waterfowl

Cartwright, B. W. Muskrats, duck production and marsh management, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D.C. $1.00 a copy), pp. 454-457, 1 table.

Big Grass Marsh, Manitoba, was an area drained, but proved unsuitable for agriculture. Drainage canals were dammed, fire guards were constructed, and peat fires extinguished. Some 10,000 acres of water were impounded at a controlled level. From an estimated 50 in 1938, the muskrat population increased to about 2,745 in 1942. Controlled trapping under government supervision was then begun. Estimated populations, catch, and revenue, 1942-45, are tabulated; total receipts nearly $60,000. The system of management is outlined. The muskrats have opened up stands of reed, bulrush, and cattail with the result that the breeding population of diving ducks has steadily increased; fire protection has brought about similar growth in numbers of the land-nesting, shoal-water ducks. Additional projects are being developed on the pattern established at Big Grass Marsh.

Management: Overpopulations

Bartlett, I. H. Fawns' fate depends on weather, Michigan Conservation (Michigan Dept. of Conservation, State Office Bldg., Lansing 13), 16(2), Feb. 1947, pp. 3, 6, 1 map.

History of winter losses of deer in Michigan, map showing relative food conditions, statement of methods that have been tried to relieve the situation, and suggestion that taking antlerless deer in a special season is a reasonably safe and effective method of reducing the herd.

Management: Pheasant, New York

Perry, Robert F. An appraisal of pheasant abundance in New York State during 1945 and some of the factors responsible for the recent decline, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 141-152, 3 maps, 4 graphs.

Fluctuations in pheasant numbers are traced; the decline in 1944 was so acute "that the open season was shortened and the bag limit reduced." Methods of the inventory reported upon are described and the factors affecting pheasant populations are discussed. Cold, wet weather during the breeding and rearing season seems to be the main factor causing scarcity of the birds. New York is predominantly hilly and has only limited first-class pheasant range. Hence stocking of pen-reared birds will be necessary if shootable pheasant populations are to be maintained.

Management: Planting for wildlife, hollies

Chapman, Floyd B. The hollies in wildlife conservation, Ohio Conservation Bul. (1106 State Office Bldg., Columbus 15. 10 cents a copy), 10(12), Dec. 1946, pp. 22-23, 1 photo.

Summary of utilization of hollies (the group) by birds and mammals, characteristics of the plants, kinds recommended, planting instructions, commercial uses, fruit-bearing seasons.

Management: Planting for wildlife, Lespedezas

Chapman, Floyd B. Lespedezas in wildlife conservation, Ohio Conservation Bul. (1106 State Office Bldg., Columbus 15, Ohio), 11(1), Jan. 1947, pp. 19-20, 2 photos.

Notes on the agricultural use of the plants and their value for wildlife. [One error noted as to bristly pods and the name "sticktights"; these pertain to the genus Meibomia.]

Management: Planting for wildlife, locusts

Chapman, Floyd B. The locusts in wildlife conservation, Ohio Conservation Bul. (1106 State Office Bldg., Columbus 15, Ohio. 10 cents a copy), 11(2), Feb. 1947, pp. 22-23, 2 photos.

Characteristics and value of the honey and black locusts and directions for planting them.

Management: Public cooperation in

Hall, Leonard. Land use and modern pressures on wildlife, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 115-122, 1 fig.

The author makes the following premises: "(1) In our modern and constantly changing world, wildlife men cannot control the use which is made of the land except in rare and isolated instances; (2) land use in the vast majority of cases rests with the private owner who is just now beginning to be affected by the sum total of effort of all the interested public agencies; (3) the immediate human need will always be the controlling factor in land use--and wildlife will always come second except on such lands as can be put to no better primary use; (4) as a result of these factors, such controls as the wildlife manager can establish on the majority of our lands will always depend upon the understanding and cooperation of allied agencies, of the private landowner, and of the public."

That hunting pressure will decrease is too much to hope. "So the balance, if it is to be held, must come through scientific management of the wildlife resource, education of the public, regulation and strict enforcement." The people must be awakened to the importance of conservation and sportsmen must realize the dependence of wildlife upon the land.

Management: Recreational hunting of big game

Johnson, Fred W., and D. I. Rasmussen. Recreational considerations of western big game hunt management, Journ. Forestry (825 Mills Bldg., Washington 6, D. C. 50 cents a copy), 44(11), Nov. 1946, pp. 902-906.

Dwelling upon social values, the authors believe that these have not increased with recent provision of more hunting. Four important requirements in the administration of big game hunting on public lands are: (1) Big game hunters should be permitted a degree of isolation compatible with good sport and herd management; (2) hunting should be distributed throughout the open seasons and over the game range in order to prevent undue hunter concentrations; (3) seasons and bag limits should be long enough and large enough to provide the greatest amount of sport possible; (4) hunting regulations should permit the most efficient utilization of the herd increases. These are discussed as are also the following five methods of improving big game hunting opportunity and the sport itself: (1) Hunt each herd on the basis of its biological herd area under a license system designated to regulate the removals by sexes and total numbers rather than on political subdivisions; (2) distribute hunting throughout the season and over the game ranges both accessible and inaccessible; (3) increase the length of adult survival and rate of herd replacement; (4) develop new big game herds; (5) improve big game habitat. "Foresters, as public land administrators, can be of great help to state game departments in the 11 western states through use of their facilities and personnel in the planning of big game hunting programs and in public hunt administration during the hunting seasons. They can be of real public service through the use of their technically trained personnel in the formulation of better big game management plans, the development of understocked game ranges, and in restoration and re-distribution of big game with the objective of making the lands under their administration of greater recreational value." Bibliography of 8 titles.

Management: Refuge

Dennis, John V. Divided waters, Audubon Magazine (1006 Fifth Ave., New York 28, N. Y. 45 cents a copy), 49(1), Jan.-Feb. 1947, pp. 2-11, 7 photos, 2 maps.

Description of silt deposition and removal, the formation of ponds, and response of marsh plants to fresh and salt water in the Mississippi Delta, Louisiana. Use of the area by wild fowl and fur animals, their interrelationships, and management.

Management: Refuge

Hooper, Emmet T. Special wildlife areas in United States National Forests, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 27(4), Nov. 1946, pp. 410-411.

Definition of wilderness, wild, roadless, primitive, natural, vanishing-species, recreation, Federal-refuge, and experimental forest and range, areas in national forests. Comment in each case on the numbers and acreage involved. Author's conclusion: "Because there are these several classes of special areas in the National Forests which embody varying degrees of protection and perpetuation of the native faunas and floras, rigid adherence to governing policies in the case of the more inviolable areas is to be expected. If an area in a class requiring strict protection must be exploited, then the classification of the

area should be appropriately changed. It is to be desired, however, that areas be rated up rather than down in the scale of protection and preservation thereby to augment the relatively few remaining natural areas in the United States."

Management: Refuge

Sprunt, Alexander, Jr. Winter resorts for birds, School Nature League Bul. (National Audubon Society, 1006 Fifth Ave., New York 28, N. Y. 15 cents a copy), 17(4), Dec. 1946, 4 pp., illus.

General account of refuges in wintering areas maintained by the National Audubon Society and the Fish and Wildlife Service, including their locations, facilities, and management. Six titles of recommended reading.

Management: Refuges and shooting grounds

Burroughs, R. D. Game refuges and public hunting grounds in Michigan, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct, 1946, pp. 285-296, 1 fig., 4 tables.

Location of the areas is mapped and statistics for them are presented in tables. Experience in habitat management and development is recounted. Author's summary: "The first state-owned big game refuge in Michigan was established in 1916; by 1924 eight refuges totalling 47,396 acres had been established; by 1934 twelve 'standard' refuges were in operation which involved 86,244 acres of land closed to hunting and 137,547 acres of surrounding public hunting grounds; by 1938 one refuge unit had been dropped reducing the area of 'closed' land to 78,996 acres, but the area of public hunting grounds had increased to 493,105 acres. By 1944 the state had acquired 1,189,064 acres of northern wild land in 24 administered units, but the area of 'refuge' land had been reduced to 37,098 acres. A shift in emphasis from refuges to public hunting grounds followed the increase of the deer population to where over-browsing became of major concern in many winter yarding areas. The Department of Conservation expended considerable effort on deer yard surveys and range management studies. Research projects dealt with the nutritional value of various browse plants; amount of available browse per acre in different types of winter deer yards; carrying capacity of deer yards; influence of forest fires on deer range; and practicability of controlled burning for range management.

"Since 1938, Federal Aid in Wildlife Restoration funds have been utilized to acquire 54, 481 acres of submarginal land on 15 projects in the southern agricultural region of the state; 9,936 acres were acquired in four southern areas with other funds. The southern areas are being managed and developed mainly as public hunting grounds, but small refuge units are incorporated wherever deemed essential. Emphasis, however, is being placed on food and cover management rather than on refuges in the management of small game mammals and birds." Bibliography of 10 titles.

Management: Skunk

Miller, Wilford L. Status of the skunk in North Dakota, North Dakota Outdoors (Capitol, Bismarck, N. Dak. 5 cents a copy), 9(8), Feb. 1947, p. 3.

Number of potential trappers and fur prices cause variation in the take of skunks and at times the animals become undesirably numerous. Their food habits are discussed, among which egg-eating may cause most damage. Control to reasonable numbers is advocated, especially by trapping for fur.

Management: Soil conservation and wildlife conservation

Bennett, Hugh H. Wildlife gains through soil conservation, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 48-49.

About all that soil conservationists do benefits wildlife. The land with which they work is important wildlife habitat so that every acre allowed to become unproductive through soil erosion reduces wildlife range just that much. The author cites damage to wildlife by erosion in Ecuador, Venezuela, and South Africa. In the United States the case is even worse; "at least a fifth of the original area of tillable land . . . is now ruined for further practical cultivation—thus damaged chiefly by erosion." "That is just cropland. All together, half of our land has been damaged by soil erosion; and of the staggering yearly cost we are paying, an important part . . . is represented by damage to our wildlife." In land management every acre should be devoted to the purpose it can serve best; in some cases that is production of wildlife. Within the agricultural area of this country, there are about 33 million acres unfit for cultivated crops, hay, pasture, or even trees. By planting and other conservation treatment, these widely scattered acres may be rendered productive of wildlife. Some of the work is now being done on soil conservation districts, organized by landowners and operators, which take in 800 million acres of land in three-fifths of the country's 3,000-odd counties. The soil- and water-conserving practices being put into effect in these districts include some of direct, measurable advantage to wildlife, as marsh management, increase in the number of farm ponds, improvement of field and woodland borders, planting of hedges and windbreaks, and protection of stream banks. The erosion control job is well begun but our biggest job is still ahead. "The farmer now has the best known means through which to achieve conservation, in soil conservation districts. For my part", says Dr. Bennett, "I am more confident today than I ever was before that this soil, water, and wildlife conservation will be realized."

Management: Stocking, goose, Canada

Johnson, C. S. Canada goose management, Seney National Wildlife Refuge, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 21-24, 1 table.

A colonization experiment in Michigan; in ten years the initial stock dwindled from 286 to 45 birds, but meanwhile produced an estimated 2,000 young. Returns were obtained from about 10 percent of the goslings banded. From author's conclusions: "(1) Nesting birds cannot be crowded; not more than one nesting pair to each half acre or acre of nesting territory has been found desirable; (2) Seney-bred geese move mainly along the Mississippi Flyway, but are of most importance to local hunters; (3) birds produced on the refuge return to the area of origin following their southern migration, but further banding is needed to determine the percentage that returns."

Management: Stocking in Virginia

Phelps, Chester F. The big five upland game animals in Virginia, Virginia Wildlife (Virginia Commission of Game and Inland Fisheries, Richmond 13. 10 cents a copy), 8(2), Feb. 1947, pp. 12-14, 17, 3 photos, 5 tables.

Discussion of recent experiences of the Commission in game farming, now restricted to the bobwhite and wild turkey, of the management including stocking of these birds, and of the white-tailed deer, cottontail, and raccoon.

Management: Stocking, pheasant

Anon. Introduced upland game birds in N. D., North Dakota Outdoors (Capitol, Bismarck. 5 cents a copy), 9(7), Jan. 1947, pp. 11-12.

Pheasant, Hungarian partridge, and chukar partridge; the last failed of establishment; the second was moderately successful; and the first a great success. History of planting and transplanting; restocking with wild-trapped pheasants was most satisfactory.

Management: Stocking, pheasant

stocking

Hoffmaster, P. J. Does pheasant pay?, Michigan Conservation (Michigan Dept. of Conservation, State Office Bldg., Lansing), 15(11), Dec. 1946, pp. 8-9, 13-14, 2 photos.

Discouraging experiences in Ohio and Michigan with releases prior to the hunting season. Pheasants are in lowered numbers almost throughout their range and State game departments, through a variety of means, are trying to improve the situation. Stocking was all important in getting the birds widely established in suitable range, and is still of value in replenishing locally depleted coverts. However, creating and maintaining favorable environment is the best assurance of abundance of pheasants. South Dakota experience is cited in illustration. In Minnesota and Michigan, stocking operations are known to have little relation to the kill. The evidence and causative factors are discussed. Moreover, stocking is expensive, cost of production per planted bird being, as a rule, more than the hunting license fee. The key to pheasant abundance does not lie in stocking but in range improvement.

Management: Transplanting beavers

Salyer, J. Clark, II. The Carolina beaver: A vanishing species?, Journ. Mammalogy (Ernest T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 27(4), Nov. 1946, pp. 331-335.

Results of protection and transplanting of a once nearly extirpated race in the Southeast, especially on five Federal wildlife refuges "indicate that the Carolina beaver still is a virile [sub]species and can be saved from extinction."

Management: Transplanting bighorns

Hunter, Gilbert N., Theodor R. Swen, and George M. Jones. The trapping and transplanting of Rocky Mountain bighorn sheep in Colorado, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 364-371, 4 photos.

After two reductions by disease, the Tarryall Mountains herd recovered until it numbered about 750. The opportunity seemed favorable for transplanting. The trap and methods used are described. Thirty-three animals were trapped, of which 2 died from injuries and one escaped, and the survivors moved 140 miles at a cost of $84.17 a head.

Management: Transplanting goats, mountain

White, Dale. Transplanting Rocky Mountain goats, Natural History (American Museum, New York 24, N. Y. 50 cents a copy), 55(1), Jan. 1946, pp. 20-23, 5 photos.

Experiences in trapping, crating, transporting, and releasing mountain goats in Montana. Notes on progress of knowledge of the animals, their characteristics, and life history.

Management: Transplanting turkeys

Baldwin, William P. Trapping wild turkeys in South Carolina, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 24-36, 1 pl., 1 fig., 1 table.

The author's findings are discussed under the heads: Baiting; trapping procedures; pole, funnel-entrance, open-front, and drop-net traps; handling, banding, and releasing; and blinds. Author's summary: "Experience since 1938 in live-trapping 70 wild turkeys in coastal South Carolina revealed that preliminary and experimental trapping cost as much as $100 per bird but that later operations on established trapping sites cost as low as $10 per turkey. The ease of trapping depended on many factors, particularly the season, the age and sex of birds, hunting pressure, and the location and types of traps. September and October trapping was best, and refuge areas offered better possibilities than hunted sections. Two automatic traps, the pole and the wire funnel types, were used, but were inferior to traps manipulated from blinds. The observer-

operated trap most used was of a 'roll-front' type employing a curtain to close the entrance. Later experimental use of a 'drop-net' trap revealed it to be more readily accepted by turkeys than other types. Further experiments under southeastern conditions are needed, but some form of 'drop-net' may be the most efficient turkey trap. Shipping crates of several types were used, but a light-weight plywood, wire, and burlap crate was developed which has given satisfactory, though limited, service in multiple shipment of turkeys." Bibliography of 8 titles.

Management: Transplanting turkey

Sylvester, Walter R., and Preston W. Lane. Trapping wild turkeys on the Kentucky Woodlands Refuge, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, pp. 333-342, 2 figs.

Notes on the ecology of the Refuge named, its turkey population, and habits of the birds as affecting trapping. A trapping site should be carefully selected and prebaited; instructions are given. Types of traps are discussed and a drop-door trap is illustrated. Transport in individual crates (figured) is preferred and suggestions are made as to releasing the birds. Authors' summary: "Live-trapping of native wild turkeys is a most desirable method of obtaining birds for restocking, but is time consuming and costly. The turkeys must be accustomed to taking bait regularly, then a trap must be built slowly at the bait site so that the surroundings are not changed sufficiently to alarm the birds. If built too rapidly or some unnatural object is left near the trap, the turkeys may stop taking the bait and all time and effort will be wasted. Turkeys are wary of feeding under any structure, even if 12 feet above the ground, hence great care must be taken in putting the top on a trap. Automatic traps have not been successful, because few birds are caught at one time. The mortality among birds caught in such traps is high because predators may enter the traps and kill the turkeys confined there. The most satisfactory trap is of two-inch poultry netting and is approximately 10 feet wide, 15 feet long, and 6 feet high, with a swinging door at each end. This allows the birds to feed through the trap. An observer is required to drop the doors when the birds are within the trap.

"It is best to release wild turkeys within 24 hours after being trapped. Narrow individual carrying crates reduce the mortality in transporting the excitable wild birds. Live-trapped eastern wild turkeys are more excitable than game-farm or wild pen-reared birds. They require more careful handling and should not be held captive longer than necessary. Trapping wild turkeys is a full-time operation, requiring a patient, skillful, and observant trapper with knowledge of the habits and peculiarities of these birds. He needs a special interest in his job and must expect long and irregular working hours."

Management: Turkey, Maryland

Wilson, Kenneth A. Wild turkey and other upland game survey and a management study Annual Report . . . [1945-46], Maryland Conservationist (512 Munsey Bldg., Baltimore 2, Md.), 23(3), Summer-Fall 1946, pp. 8-13, 23, 1 photo, 8 tables.

Besides a summary of management practices applied, this article contains considerable information on the food habits of the turkey and of red and gray foxes. Weights of several of each of these mammals also are recorded.

Management: Waterfowl

Hochbaum, H. Albert. Recovery potentials in North American waterfowl, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D.C. $1.00 a copy), pp. 403-416, 2 tables.

"The great wildlife tragedy of the past decade is the false optimism that has attended the rise in waterfowl populations. . . Management has taken much credit for the rise . . . but management has failed. We have gone from reported overpopulations to poor flights in 2 years . . . Management has failed in one of its most important functions. It has failed to foresee the current plight of waterfowl; it has failed to predict . . . to manage, and regulate the harvest in accordance with prevailing conditions that were measurable and predictable. Let us hope that we may learn. The future of waterfowl as game birds still depends upon management." There is this and other hard-hitting comment by one who knows the field.

The positive contribution of his paper is discussion of the reasons for differential recovery rates in important game ducks. "Numbers in waterfowl probably have an important bearing on recovery rates. The larger the population, the better its chance to increase in numbers . . . When numbers are large, the spread of the breeding population is such that it can absorb local adversities. It can suffer regional setbacks and still show an over-all gain." Thus the mallard and pintail are better able to maintain their numbers than some of the less numerous species. Again the most successful species have the widest ranges. Young canvasbacks and redheads require several more weeks to reach the flying stage than do young mallards and pintails. This handicap is emphasized now that survivors of these species are largely restricted to the northern part of their original breeding range. Within the outlined breeding ranges, vast regions are untenable for ducks and management has as yet been able to do little to overcome the effects of drought except in established irrigation districts. Important species of diving ducks, as the redhead, canvasback, and ruddy, nest over water in emergent vegetation. Such habitat is restricted and is readily damaged by changing conditions. The river ducks, primarily land nesters, have much greater choice of nesting sites and are relatively less affected by varying water supply. River ducks are spread, diving ducks are concentrated, and for various reasons concentrations are dangerous. The river ducks are more adaptable, hence sooner occupy new habitat. Preponderance of males, probably an important factor in reproduction, is much greater in the diving, than in the shoal-water, ducks. Management can more easily benefit the land-nesting puddle ducks than the water-nesting divers. Suggestions are made as to regulation of hunting seasons and localities to favor certain species. The need of adequate inventory is emphasized. "We have not even developed the techniques for appraising waterfowl populations on the breeding grounds." Illustrating the potentialities in recovery rates, the author contrasts the traits of the successful mallard with those of the unsuccessful red-

head. For the former species, 13 traits are judged to advance, and 2 to retard, recovery, while for the redhead the ratio is exactly reversed. He notes that the redhead is one of the least wary of game birds and the abstracter has seen redheads return to, and even alight among, decoys where some of their number had already been killed. If we are to assure the continuance of a species of such vulnerability, we probably shall have to put it on the nongame list. Bibliography of 20 titles.

Management: Wildlife on Indian reservations

Krefting, Laurits W. Advancements in wildlife management on Indian lands, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 434-441.

Report on work on north-central reservations having a population of some 75,000 Indians. Conditions affecting big game, small game, and fur animals are discussed and also education in wildlife conservation. Author's conclusion: "Substantial progress has been made in the management of the wildlife resources on 8 million acres of Indian lands in the Dakotas and Lake States during the past 4 years, but much work still remains to be done. Due to the Indians' concept of wildlife as a utility rather than as a source of recreation, the greatest interest has been shown in the management of their fur-bearing animals. Regulated seasons, fur enterprises, marketing cooperatives, and restocking programs are all examples of the advancements made in fur management on these lands. Conservation through visual education has been well received by both school children and adults. A sequence to this program should be adoption of a standardized course in conservation education for the children and an extension program for the adults. Game regulations are now in effect on a number of reservations, but there are still many where no conservation practices are being followed."

Management: Winter feeding

Anon. Deer feeding, Wisconsin Conservation Bul. (Wisconsin Conservation Dept., Madison 2), 11(8-9), Aug.-Sept., 1946, pp. 28-30.

Report on nutritional value of 14 diets experimentally fed and on carrying capacity of enclosures in a typical northern Wisconsin deer yard. Summary: "In several . . , controlled feeding experiments, balsam proved to be a poor deer food, but showed some value, especially when fed with hay. Several mixed browse diets were fed, but none of those tried maintained the weight of the deer satisfactorily. A fair grade of alfalfa hay proved to have considerable sustaining value, especially when supplemented with other feeds. Some straight diets of commercial concentrates carried deer throughout the test period with little or no loss in weight. Jack Pine and Red Oak diets fed in Central Wisconsin pens failed to maintain minimum weight requirements for the deer in the experiment. The yard carrying capacity experiment at Ladd Creek, in Rusk County, showed that a yard of this type and amounts of natural food will not satisfactorily carry 3 deer per acre. Both, 1 deer and 2 deer per acre also resulted in heavy browsing. Such an area would carry one deer per acre for one

year. The results of successive years of such browsing has not yet been determined. . . An aerial test survey in eight northern counties and five central counties proved the efficiency of light planes with good observers for determining boundaries of deer yards and locating new winter concentration areas. Deer concentrations could be fairly well estimated by comparing density of tracks and trails on the ground. An actual deer count census by airplane over forest areas in Wisconsin is not possible."

Management: Winter feeding, bobwhite

Latham, Roger M. Feeding bobwhites in winter, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg. 10 cents a copy), 17(10), Jan. 1947, p. 8, 1 photo.

To supply sufficient vitamin A, whole or cracked yellow corn is recommended.

Natural History: Bears

Goodwin, George G. The carnivores. Part I--Bears, School Nature League Bul. (National Audubon Society, 1006 Fifth Ave., New York 28, N. Y. 15 cents a copy), 17(5), Jan. 1947, 4 pp., illus.

Authoritative summary of distribution, characteristics, and habits of bears in general and of the American groups of black, grizzly, brown, and polar, bears. Four titles of recommended reading.

Natural History: Birds and mammals of British Columbia

Munro, J.A. Observations of birds and mammals in central British Columbia (British Columbia Provincial Museum, Victoria, Canada. 50 cents a copy), Occasional Papers No. 6, 165 pp., 50 figs. (on inserted plates), 13 tables, Jan. 1947 (offset process).

The descriptions of the localities studied contain information on the characteristic vegetation (fuller than often found for aquatic environments), and also on the more common birds and apparent food resources. There is a summary of water fowl observations; many waters suited to the birds have insignificant or no populations of waterfowl. [Does this not suggest lack of sufficient breeding stock to occupy the environment?] There are annotated lists, giving fullest treatment to game birds and fur and game mammals, and an account of the trapping industry and fur-farming. In all a work that only a very broadly informed naturalist could have prepared.

Natural History: Hibernation

Hamilton, W. J., Jr. Winter sleep. Animals that hibernate, School Nature League Bul. (National Audubon Society, 1006 Fifth Ave., New York 28, N. Y. 15 cents a copy), 17(6), Feb. 1947, 4 pp., 5 photos.

Popular statement of the prevalence of hibernation (also aestivation), theories to account for the phenomenon, characteristics of the state, the hibernation period, spring emergence, and unsolved problems in this field.

Natural History: Mammals of Canada

Anderson, Rudolph M. Catalogue of Canadian recent mammals. Bul. 102, National Museum of Canada (Ottawa, 75 cents a copy), 238 pp., 1 fig., 1 table, 1946 (Jan. 1947).

The introduction states that the mammals of Newfoundland and Greenland also are within the scope of the publication; the life zones of Canada are briefly described and mapped; pertinent literature is noted; taxonomic groups are discussed; and the plan of the catalogue is set forth. The systematic list, covering 594 forms, gives for each, technical, English, and French names, synonymy, type locality, and range. The status of two introduced forms of reindeer is presented, and a list of mammals likely to be found in Canada, a gazetteer of type localities, and a good index complete the volume. An evidently thorough condensation of present knowledge of its subject.

Natural History: Mammals of Idaho

Rust, Henry Judson. Mammals of northern Idaho, Journ. Mammalogy (Emmett T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 27(4), Nov. 1946, pp. 303-327, 1 map, tables.

Description and map of the area, tabulation of zonal distribution of the 75 forms treated, and annotated list. The latter contains much information on life histories, food habits, and economic values.

Natural History: Mammals of Michigan

Burt, William H. The mammals of Michigan (University of Michigan Press, Ann Arbor. $3.50 a copy), xv+288 pp., 13 col. pls., 107 figs., 67 range maps, 6 tables. 1946.

In an era of well-done, state books on mammals, this ranks with the best. The distribution maps showing both the North American, and in detail the Michigan, ranges are excellent. The work is thoroughly illustrated and some of the colored plates, by Richard P. Grossenheider, are among the finest pictures of small mammals ever made. Chapters are devoted to earlier accounts of the mammals of the State, relationship of the fauna and changes in it during historic time, economic importance of the animals, adaptive radiation, home ranges and territories, populations (including census methods), and collection and preparation of specimens (well illustrated). There are separate artificial keys to skins and skulls, with drawings to clarify the characters. The species accounts, making up the bulk of the book, include dental formulas, measurements, description, illustrations, range maps, and notes on habitat, habits, and economic status. Bibliographic references are scattered throughout the book in connection with the sections to which they pertain. In an appendix is a useful tabular summation of measurements and life history data. There is an adequate index.

Natural History: Variations in Ohio bird populations

Moseley, Edwin Lincoln. Variations in the bird population of the North-Central States due to climatic and other changes, Auk (Frederick C. Lincoln, Fish and Wildlife Service, Dept. of the Interior, Washington 25, D. C. $1.00 a copy), 64(1), Jan. 1947, pp. 15-35, 1 pl.

Gleanings from literature and a long life's experience on the effect of moderating climate, wet and dry periods, weather vagaries, introduced species, and activities of man, on the occurrence and abundance of birds, especially in Ohio.

About the same matter was published also in Ohio Journal of Science (John A. Miller, Ohio State University, Columbus. 50 cents a copy), 46(6), Nov. 1946, pp. 308-322. Title: "Variations in the bird population of Ohio and nearby states".

Predation

Nagel, W. O. The real meaning of predation, Missouri Conservationist (Missouri Conservation Commission, Jefferson City), 8(1), Jan. 1947, pp. 4-5, 15, 2 figs.

Either as agent or victim of predation, practically all living things are involved. It is part of nature's insurance that no one species will over-run the earth. The reproductive potential of Missouri rabbits, six million to six billion in three years, shows that predation is necessary, and from man's point of view useful. Predation has also a sanitative effect upon wildlife. Man's upsetting of the balance frequently calls for additional interference and whether the results are good or bad depends upon whether the action taken is rationally directed. "Thus, to avoid and reduce predator damage, we must first understand that the management of predation, like the management of game and of crops, is a part of the management of the one basic resource from which all others stem--the land. Good predator management is, first of all, wise land use."

Predation: Snakes vs. birds

Laskey, Amelia R. Sanke depredations at bird nests, Wilson Bul. (Josselyn Van Tyne, University of Michigan Museum, Ann Arbor. 50 cents a copy), 58(4), Dec. 1946, pp. 217-218.

Observations in Tennessee; snakes identified: racers (Coluber) and pilot snake (Elaphe). Details of predation are given, ineffectual trial of guards recorded, and estimates made of the extent of nest-robbing by snakes 1941-45, inclusive. It appears to be high.

Propagation: Electric incubator

Yeatter, R. E. Electric incubator for gamebird eggs, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, pp. 342-347, 1 pl., 5 figs.

Description and illustrations with suggestions for operation of a small incubator that can be made at a cost of about $6 for materials.

Propagation: Feeding bobwhites

Coburn, Don R., and Ralph B. Nestler. Food particle size and quality in relation to disease in artificially propagated quail chicks, Journ. Amer. Veterinary Medical Assoc. (600 S. Michigan Ave., Chicago, Ill. 75 cents a copy), 110(838), Jan. 1947, pp. 30-34, tables.

Authors' summary: "A disease complex in Bobwhite quail chicks, due to mechanical injury from certain food constituents, is described. From the standpoint of survival, live weights, and feed consumption through the eighth week, the Hammer mill 3/32-in. screen grind was significantly better statistically than any of three other approximate sizes. The inclusion of alfalfa meal as a source of fiber did not influence mortality rates when used in amounts of less than 7 per cent of the diet. Of nine cereals used in the diet of growing quail, millet consistently gave the best results considering survival, bird weights, and feed consumption. Greatest preference in a choice of mashes based on the cereals under consideration was for the one containing millet as the sole cereal. Any of the cereals successfully replaced half of the corn in the diet, millet, wheat, and rye being the leading three." Bibliography of 7 titles.

Propagation: Vitamin A in quail feeding

Nestler, Ralph B. Vitamin A, vital factor in the survival of bobwhites, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 176-192, 11 figs., 1 table.

The properties of Vitamin A and the experimental procedure of this author in studying its importance to bobwhites are set forth, and the experiments described and discussed. The optimum levels were found to be 6,000 I. U. per pound of feed for breeding stock, 3,000-4,000 for growing birds, and 2,500 for winter maintenance. At adequate levels, some Vitamin A is stored in the liver. From author's summary: "A lack of vitamin A for 3 weeks was fatal to all chicks; for 4 weeks, to 93 percent of adult birds, depending on the quantity of vitamin A they had received and stored previously. A deficiency of vitamin A in the diet of the breeders affected their own survival, their reproduction, and the survival of their offspring; a deficiency in the growth diet affected the growth-rate and survival of chicks and their livability during winter; a deficiency in the winter-maintenance diet affected winter-survival and subsequent production. The vitamin A content of the breeders' diet affected the storage of vitamin A by their offspring; and the vitamin A content of the growth-diet affected the storage of vitamin A during winter. Pure carotene (90 per cent beta, 10 per cent alpha) was not utilized as efficiently as true vitamin A; neither was it stored as vitamin A in the birds' livers in as large quantities as was true vitamin A fed at the same level. Submarginal and marginal intakes of vitamin A or its precursor, carotene, were often sufficient to prevent death from avitaminosis, but lowered the birds' vitality and alertness, affected their eyesight, and in general undermined the physical condition, so

that there was less ability to resist disease, adverse weather, or predation.

"The results indicate that vitamin A deficiency may be a potent factor in the frequent lack of success with pen-reared quail in restocking programs, and also in the mysterious periodic fluctuations in populations of wild quail as well as the shrinking of their natural range." Bibliography of 25 titles.

Propagation: Vitamin A in quail feeding

Nestler, Ralph B., and R. Stow. Game birds need more vitamin A, Game Breeder and Sportsman (1819 Broadway, New York 23, N. Y. 25 cents a copy), 51(7), Sept. 1946, pp. 74-75, 83, 1 photo, 2 tables.

From experiments with pen-reared quail, it is concluded that vitamin A is essential for survival and production of fertile eggs. In fact these increased in proportion to the quantity of vitamin A in the diet, the optimum level being 6,000 I. U. per pound of feed. When this vitamin is withheld, survival is in proportion to the abundance in which it was previously fed to the birds, there being some storage in the liver. A table records this storage in experimental birds on various levels of vitamin A feeding in comparison with that in specimens from game farms and from the wild. Chicks without access to vitamin A died within three weeks after hatching. The optimum quantity of the vitamin for winter survival was insufficient for reproduction. Details of the experimental results are given and comment made on the lowered value of vitamin-deficient birds for stocking purposes. The amounts of true vitamin A and of carotene in commercial and other feed mixtures is tabulated. These essential factors decrease with length of storage of the feeds or their ingredients.

Research: Color vision

Kalmbach, E. R., and J. F. Welch. Colored rodent baits and their value in safeguarding birds, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, pp. 355-360, tables.

Report on studies additional to those summarized by Kalmbach in 1943 (see WILDLIRE REVIEW, No. 40, June 1944, pp. 51-52). Experiments were made in the field (in Colorado) with green, yellow, and uncolored rolled-oats poison baits. Few birds were killed by the colored, but a good many by the uncolored, baits. Experiments in South Dakota with non-poisoned grain revealed acceptance in descending proportion of uncolored, yellow, and green grains. A test in California by R. W. Enderlin showed that valley quail avoid brightly colored grain. As rodents seem indifferent to colors, it is hoped to develop baits they will take and birds refuse, as a means of sparing bird lives in rodent-poisoning campaigns.

Research: Enumerating waterfowl

Spinner, George P. Improved method for estimating numbers of waterfowl, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 10(4), Oct. 1946, p. 365, 2 pls.

Photographs made from airplane, upon which the birds were carefully counted, were used in subsequent flights as standards for estimating the numbers of birds in segments of flocks.

Research: Food analyses

Jensen, G. H., and L. J. Korschgen. Contents of crops, gizzards, and droppings of bobwhite quail force-fed known kinds and quantities of seeds, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 37-43, 2 figs., 5 tables.

Account of experiments to compare different methods of estimating crop and gizzard contents in food habits analyses. Results by the volume and weight methods were in close agreement. For management studies, percent by volume may give sufficiently accurate information. Suggestions are made as to nutritional experiments.

Research: Invasion of depopulated range

Stickel, Lucille F. The source of animals moving into a depopulated area, Journ. Mammalogy (Emmet T. Hooper, University of Michigan, Ann Arbor. $1.00 a copy), 27(4), Nov. 1946, pp. 301-307, 2 figs., 1 table.

Results of experimental trapping on the Patuxent Research Refuge, Md. The methods of the study and experiences with live-trapping and snap-trapping are discussed. Author's summary: "(1) The wood mouse (Peromyscus leucopus) population in a 17-acre area of bottomland forest was live-trapped, marked and released over a 7-night period. Following the live-trapping a central 1-acre plot was snap-trapped for 35 consecutive nights. All adult animals taken in the central snap-trapped plot had previously been taken, marked, and released in the live-trapped 17-acre area; (2) animals taken first in the central acre were those whose normal ranges overlapped or closely approached this area. After these were removed from the area the animals captured in the central acre were in general those whose normal ranges were at succeedingly greater distances. Ingress was from all directions; (3) most of the animals taken in the central area were those with previously established nearby home ranges, not merely vagrant animals; (4) thirty-six of the invading animals were adult males, 18 were adult females, and 22 were young juveniles recently emerged from nests. Numbers of male and female adults had been shown in the live-trapping to be approximately equal." Bibliography of 7 titles.

Research: Ovulation in pheasant

Meyer, Roland K., Cyril Kabat, and Irven O. Buss. Early involutionary changes in the post-ovulatory follicles of the ring-necked pheasant, Journ. Wildlife Management (Logan J. Bennett, 206 Forestry Bldg., State College, Pa. $1.00 a copy), 11(1), Jan. 1947, pp. 43-49, 1 pl., 1 fig., 1 table.

Account of materials and methods and discussion of the results. Authors' summary: "The post-ovulatory follicles of artificially-propagated pheasants involute rapidly within a period of 5 days after ovulation. Further involution is a very slow process and results in small pigmented structures which persist for at least 15 days post-ovulation. The involuting post-ovulatory follicle provides a basis for determining ovulation rates in artificially-propagated pheasants during the breeding season and provides a method for studying ovulation rates in wild pheasants as related to population problems." Bibliography of 8 titles.

Research: Waterfowl on wintering areas

Hawkins, Arthur S., and Frank C. Bellrose, Jr. A waterfowl reconnaissance in the Grand Prairie region of Arkansas, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 394-401, 2 tables.

The study area is described and the results of the investigation discussed and tabulated. One table shows the number of mallards killed in 9 states from a total of 1,714 banded in Illinois. Authors' conclusion and summary: "Wintering grounds offer a fertile field for waterfowl research, a field scarcely touched up to the present time. Studies similar to the one herein reported should be repeated in Arkansas and inaugurated elsewhere. Only through such studies can we hope to remove the guesswork from waterfowl accounting."

"(1) To date, research has received little of the funds used to maintain our waterfowl population; as a result, fundamentals of management have been neglected; (2) more accurate information is needed concerning the composition and size of wintering populations, food conditions, mortality rates from various causes, and the wintering-ground behavior of waterfowl; (3) a brief study of wintering mallards in the Grand Prairie rice area of Arkansas has provided us with some of the information that is needed from all parts of the wintering grounds; (4) one hundred mallard stomachs from Grand Prairie contained 90 per cent weed seeds, 10 per cent rice, no soybeans; (5) age and sex ratios based on an inspecition of 711 mallards were 0.7 juveniles per adult and nearly 56 per cent drakes; (6) kill figures covering three hunting seasons indicated that the kill in 1945-46 was the greatest. The estimated take-home kill by Arkansas hunters during the 1945-46 season was not over 127,000, about half the Illinois kill; (7) many mallards are paired by the first of the year while the hunting season still is in progress. The significance of breaking up pairs at that season is unknown; (8) Present bookkeeping methods on waterfowl leave much to be desired. Wintering grounds offer excellent opportunities for obtaining greater accuracy in measuring waterfowl populations."

U. S. Government: Pittman-Robertson program

Rutherford, R. M. Pittman-Robertson program accomplishments and prospects, Trans. Eleventh N. A. Wildlife Conference 1946 (Wildlife Management Institute, Investment Bldg., Washington 5, D. C. $1.00 a copy), pp. 447-452.

Report on funds expended from 1938 to 1945, and suggestions as to moneys available for appropriation. The program has resulted in employment for many technically trained men, four of whom now head fish and game departments in as many states. Thirty percent of the funds obligated on approved projects went to finance research. Facts are given about some of these studies and the results obtained. Among other activities have been: restocking, planting for wildlife, impounding water, and acquiring land and water areas for refuges and public shooting grounds. Future work is discussed, including various types of research, establishment of small refuges for farm wildlife, acquisition of winter range for big game animals, further purchases of sites for waterfowl refuges and public shooting grounds, and miscellaneous developmental activities. Bibliography of 6 titles.

Appendix

Conservation: Swan, Trumpeter

Anon. Trumpeters of the sky. Their battle is only half won, Outdoor Montana (1004 Eleventh Ave., Helena, Mont. 20 cents a copy), 2(1), Feb.-March 1947, pp. 4-8, 2 pls.

Swan's down and skins were articles of barter in the early fur trade. From 1853 to 1877, the Hudson's Bay Company sold 17,671 swan skins. By 1877 the number for the year dropped to 122 and by 1913, the price had risen to $150 a skin. It is not known what proportion of these skins were those of the trumpeter swan. Real protection of this bird began in 1931 with offer of a $50 reward by the Montana State Game Commission for aid in the conviction of anyone found disturbing or killing the birds. The Red Rock Lakes were set aside as a Federal reservation in 1935 and by management there the number of swans steadily increased. There are now about 300 in the United States [and 900 in Canada. See abstract of Lewis's address, page 31]. Characteristics of the trumpeter swan are described and notes on its life history are given. Strict protection is urged.

Destruction: By DDT

Kozlik, Frank M. The effects of DDT on birds, Passenger Pigeon (J. Harwood Evans, 517 Jackson Drive, Oshkosh, Wis.), 8(4), Oct. 1946, pp. 99-103, 2 photos, tables.

Report on study of control and check plots in the Nicollet Forest, Oconto County, Wisconsin. Author's conclusion: "All evidence gathered from this study indicates that DDT concentrations of one pound and two pounds per acre have no apparent adverse effect upon birds. This substantiates findings of Fish and Wildlife Service technicians which indicated a DDT concentration of five pounds per acre before any dead birds were found. Properly applied, light concentrations of DDT should give good insect kills without harmful effect to birds. However, repeated annual spraying of an area may so reduce the insect population that bird populations would be affected by the depleted food supply." Bibliography of 5 titles.

Diseases and Parasites: Blood parasites

Fowle, C. David. The blood parasites of the blue grouse, Science (Lancaster, Pa. 15 cents a copy), 103(2685), June 14, 1946, pp. 708-709.

From 44 specimens taken in British Columbia. The four usual genera and microfilariae were noted; their incidence was higher in adult than in immature birds. Mixed infections were found in 7 individuals. "None of the birds examined appeared to be suffering any ill effects from infections by any of these parasites."

Diseases and Parasites: Ectoparasites of mammals

Randolph, Neal H., and Richard B. Eads. An ectoparasitic survey of mammals from Lavaca County, Texas, Ann. Ent. Soc. Amer. (Dept. of Zoology and Entomology, Ohio State University, Columbus. $1.50 a copy), 39(4), Dec. 1946, pp. 597-601.

List by hosts of 15 wild species, the cat, dog, and house mouse and rat. Bibliography of 10 titles.

Diseases and Parasites: Siphonaptera, Trichopsylla

Eads, Richard B. A new species of flea from the field mouse, Baiomys taylori, Ann. Ent. Soc. Amer. (Dept. of Zoology and Entomology, Ohio State University, Columbus. $1.50 a copy), 39(4), Dec. 1946, pp. 545-548, 1 pl.

Trichopsylla ironsi; description, illustrations, comparative notes; Texas.

Introductions: Deer, Red

Vinson, Carlos. Kentucky's red deer problem, Nature Magazine (1214 Sixteenth St., N. W., Washington 6, D. C. 50 cents a copy), 40(3), pp. 153-154, 2 photos.

History of their introduction to the State where 67 animals were released in 1934. Their increase resulted in depredations on farms and a special season for reducing them was opened in 1945. Only 29 of the animals were killed, however, and the total remainder probably exceeds 500. "Due to their tendency to graze, their heavy damage to agricultural crops, and their apparent competition with native deer in the mountain browse areas for food, Kentucky officials have found it undesirable to introduce the red deer in other areas of the State. In fact . . . they would like very much to get rid of the animals that they have."

Life Histories: Cardinal

Young, Howard. Further studies on the cardinal, Passenger Pigeon (J. Harwood Evans, 517 Jackson Drive, Oshkosh, Wis.), 8(4), Oct. 1946, pp. 104-109, 2 maps, 1 graph.

Density of population computed from Christmas bird censuses; and range expansion in Wisconsin and in general. Author's summary: "(1) The cardinal populations center around Kentucky and Missouri, becoming progressively less in any direction from these centers; (2) Christmas Census statistics show a slow increase in the general cardinal population since 1900; (3) the cardinal apparently is non-cyclic; (4) the cardinal generally is confined to the zones of the Austral Region, but is now penetrating the Canadian Zone; (5) there are numerous northern records of cardinals antedating the present spread; (6) in Wisconsin the spread is since 1900, and in the main part has been from the valleys of the major rivers in the western part of the state. The spread was slow into the central sand area." Bibliography of 19 titles.

The impression should not be received that the cardinal has spread because of population pressure, for its progress seems to be part of a rather general northward advance due presumably to amelioration of climate. The tufted titmouse, mockingbird, opossum, and gray fox are well-known participants in the movement.

Life Histories: Jays, crows, and titmice

Bent, Arthur Cleveland. Life histories of North American jays, crows, and titmice. U. S. National Museum, Bul. 191 (Supt. of Documents, Washington 25, D. C.), xi+495 pp., 68 pls., 1946 (rec'd. March 1947).

This is the 15th volume in this series, which is invaluable for its summary of the literature and of much previously unpublished material on general habits, nesting, eggs, food, voice, field marks, migration, and distribution of North American birds. The author, now 80 years of age, is to be congratulated on having carried the work so far; may he live to complete it. Chapters have been contributed to the present volume by 6 additional authors.

SPECIAL ARTICLE

Plant names indicating utilization by wildlife

This article supplements one of the same title that appeared in WILDLIFE REVIEW, No. 12, February 1938, pp. 22-36. In general, the remarks introductory to that paper apply here. It may be useful to restate the meanings of the abbreviations used in the alphabetic register: C, cover; B, browse; H, herbage; M, mast; F. fruit; and S, seed.

Alphabetic Register

Bäfwerträ (Sw., beaver tree)
Magnolia virginiana Bark

Bärenblatt (Ger., bear leaf)
Spathyema foetida H

Bärenwurzel (Ger., bear root)
Spathyema foetida Rootstock

Bear berry
Clintonia borealis F
Rhamnus californica F
Shepherdia canadensis F

Bear clover
Chamaebatia foliolosa B

Bear grass
Dasylirion wheeleri Rootstock?

Bear plum
Clintonia borealis F

Bear's corn
Clintonia borealis F

Bear's food
Lysichiton kamtschatcensis H

Bear's grape
Phytolacca decandra F

Beaver root
Castalia odorata Rootstock

Beaver wood
Magnolia virginiana Bark

Bever boom (Dutch, beaver tree)
Magnolia virginiana Bark

Bird cherry
Rhamnus frangula F

Bereblad (Dutch, bear leaf)
Spathyema foetida H

Berewortel (Dutch, bear root)
Spathyema foetida Rootstock

Bieberbaum (Ger., beaver tree)
Magnolia virginiana Bark

Björnbär (Sw., bear berry)
Rubus occidentalis F

Björnblad (Sw., bear leaf)
Spathyema foetida H

Björnrot (Sw., bear root)
Spathyema foetida Rootstock

Bois a perdrix (Fr., Partridge wood, i.e. bush)
Shepherdia canadensis C, B, F

Buffalo berry
Shepherdia canadensis B

Buffalo grass
Hilaria mutica H

Catbird grape
Vitis palmata F

Crow berry
Phytolacca decandra F

Deer grass
Xerophyllum tenax H

Deer weed
Hosackia glabra H

Duck grass
Vallisneria spiralis H

Duck weed
Vallisneria spiralis H

Fox berry
Callicarpa americana F

Goose grass
Equisetum spp. Rootstock
Scirpus americanus Rootstock
Scirpus olneyi Rootstock

Graine d'ours (Fr., bear corn)
Arctostaphylos uva-ursi F

Gray-duck grass
Potamogeton foliosus HS

Humming-bird weed
Chelone glabra Nectar

Herbe a outarde (Fr., goose grass)
Zostera marina H

Herbe aux canards (Fr., duck grass)
Vallisneria spiralis H

Herbe canard-gris (Fr., gray-duck grass)
Potamogeton foliosus HS

Manatee grass
Cymodocea manatorum H

Moose elm
Ulmus fulva B

Musträ (Sw., moose tree)
Dirca palustris B

Partridge berry
Symphoricarpos occidentalis F
Vaccinium vitis-idaea F
Viburnum lentago F

Partridge plant
Gaultheria procumbens BF

Pigeon berry
Amelanchier spicata F
Cornus canadensis F
Cornus candidissima F
Rubus americanus F

Possum berry
Callicarpa americana F
Viburnum nudum F

Rabbit bush
Amorpha canescens B

Rabbit clover
Oxalis stricta H

Racine d'ours (Fr., bear root)
Actaea alba Rootstock?
Spathyema foetida Rootstock

Raisin d'ours (Fr., bear grape)
Arctostaphylos uva-ursi F

Sorbier des oiseaux (Fr., bird sorb or service-tree)
Sorbus americana F

Squirrel pine
Pinus pungens M

Swan root
Sagittaria latifolia Tubers

Teal weed
Potamogeton natans S

Turtle grass
Potamogeton perfoliatus H
Thalassia testudinum H
Zostera marina H

Vogelbeerbaum (Ger., bird berry tree)
Sorbus americanus F

Vossendruif (Dutch, fox grape)
Vitis labrusca F

Systematic Register

EQUISETACEAE
Equisetum spp.
Goose grass

PINACEAE
Pinus pungens
Squirrel pine

POTAMOGETONACEAE
Zostera marina
Herbe a outarde
Turtle grass

Cymodocea manatorum
Manatee grass

Potamogeton foliosus
Gray-duck grass
Herbe canard-gris

POTAMOGETONACEAE--Continued
Potamogeton natans
Teal weed

Potamogeton perfoliatus
Turtle grass

ALISMACEAE
Sagittaria latifolia
Swan-root

HYDROCHARITACEAE
Thalassia testudinum
Turtle grass

Vallisneria spiralis
Duck grass
Duck weed
Herbe aux canards

GRAMINEAE
Hilaria mutica
Buffalo grass

CYPERACEAE
Scirpus americanus
Goose grass

Scirpus olneyi
Goose grass

ARACEAE
Lysichiton kamtschatcensis
Bear's food

Spathyema foetida
Bärenblatt
Bärenwurzel
Bereblad
Berewortel
Björnblad
Björnrot
Racine d'ours

LILIACEAE
Xerophyllum tenax
Deer grass

Dasylirion wheeleri
Bear grass

Clintonia borealis
Bear berry
Bear's corn
Bear plum

ULMACEAE
Ulmus fulva
Moose elm

PHYTOLACCACEAE
Phytolacca decandra
Bear's grape
Crow berry

UMBELLIFERAE
Castalia odorata
Beaver root

MAGNOLIACEAE
Magnolia virginiana
Bäfwerträ
Beaver-wood
Beverboom
Bieberbaum

RANUNCULACEAE
Actaea alba
Racine d'ours

ROSACEAE
Sorbus americana
Pigeon berry
Sorbier des oiseaux
Vogelbeerbaum

Rubus americanus
Pigeon berry

Rubus occidentalis
Björnbär

Chamaebatia foliolosa
Bear clover

PAPILIONACEAE
Hosackia glabra
Deer weed

Amorpha canescens
Rabbit bush

OXALIDACEAE
Oxalis stricta
Rabbit clover

RHAMNACEAE
Rhamnus californica
Bear berry

Rhamnus frangula
Bird cherry

VITACEAE
Vitis labrusca
Vossendruif

Vitis palmata
Catbird grape

THYMELACEAE
Dirca palustris
Mustrd

ELAEAGNACEAE
Shepherdia canadensis
Bear berry
Bois a perdrix
Buffalo berry

CORNACEAE
Cornus canadensis
Pigeon berry

Cornus candidissima
Pigeon berry

ERICACEAE
Gaultheria procumbens
Partridge plant

Arctostaphylos uva-ursi
Graine d'ours
Raisin d'ours

Vaccinium vitis-idaea
Partridge berry

VERBENACEAE
Callicarpa americana
Fox berry
Possum berry

SCROPHULARIACEAE
Chelone glabra
Hummingbird weed

CAPRIFOLIACEAE
Viburnum lentago
Partridge berry

Viburnum nudum
Possum berry

Symphoricarpos occidentalis
Partridge berry

NOTES AND ITEMS

The paper by H. H. T. Jackson, "Conserving endangered wildlife species", which was abstracted in WILDLIFE REVIEW, No. 43, June 1945, p. 4, has been reprinted in The Smithsonian Report for 1945 (pp. 247-272, 13 pls.; separate received January 1947), with the addition of 25 illustrations, mostly photographs, of wildlife.

The book cited in this paragraph would have been noted long ago had it come to attention. It includes much interesting lore about the plants treated, including a good many notes on their utilization by wildlife. Every species is illustrated. Jaeger, Edmund C., Desert Wild Flowers, Stanford University Press, xii+322 pp., 1940.

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